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ANNEALING FURNACES.

SOME SUGGESTIONS REGARDING IMPROVED TYPES FOR ECONOMICAL PRODUCTION.

By R. S. Moore.*

R. S. MOORE.

While metal rolling firms have been devoting their time and attention during the last few years to the improvement of their rolling plant, in order to turn out more work and at a cheaper rate, it is surprising that so little attention has been given to the improvement of their annealing furnaces, as it depends entirely on the latter, whether the plant (steam, gas or electricity driven) works well and economically or not. The durability of the machinery also largely depends on the annealing furnaces, because bars, sheets, tubes, etc., which have been unequally heated and therefore having varying degrees of hardness, set up sudden and heavy stresses upon the machinery, causing broken rolls, stripped gearing and other breakdowns, which entail considerable trouble and expense. It will be seen therefore that a great many of the defects and breakdowns in the machinery are the direct result of trying to anneal the metal in furnaces of unsuitable design and construction. From a financial point of view the most modern plant will not effect saving of half as much, in comparison with the discarded engine, as the modern annealing furnace does compared with the old type of furnaces, as the latter require double as much coal to heat the metal, and then not satisfactorily, with the result that the metal requires more power and time for rolling, more handling, more fuel for reheating, more pickling and cleaning, and finally more selling.

These facts will be accepted and appreciated by those readers of this journal who have been engaged or interested in metal rolling or working. The writer thinks, therefore, that a short description of a few modern furnaces, pointing out at the same time the improvements effected in the construction of the latter over the old type, will be interesting to them. A better example of how a furnace should not be is shown in Fig. 1. This is a type of "open" annealing furnace, which exists even today in a great many works. This type consumes double as much coal as is necessary and even then the metal is annealed very unevenly, being burnt at one end and not warmed through at the other. This can be easily understood when one looks at the figure. The fire (A) is about as far away as possible from the working door (B), where the greatest heat is needed to compensate for the admission of cold air while putting the metal in and taking it out of the furnace. The counterarch (C), which extends from the firebridge wall about two thirds the length of the annealing chamber, is originally 4½ ins. thick, but owing to the deposit of non-combustible and refractory particles given off by the common classes of fuel generally used, a thickness of 7 ins. to 9 ins. soon exists, and which, owing to the non-conducting properties of the deposit, prevents the metal on the bed (D) directly under the counter arch from getting hot in a reasonable time and renders the uniform heating of long metal absolutely impossible, as that part of the metal in the open space between the counterarch and door

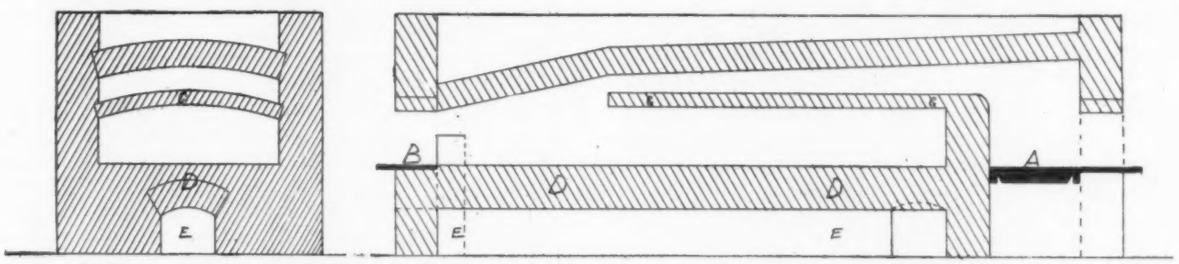

FIG. 1. SHOWING HOW AN ANNEALING FURNACE SHOULD NOT BE BUILT.

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becomes hot and frequently burnt before the metal under the counterarch is hot enough to anneal. To overcome this fault and obviate the serious consequences, when the front ends of long metal are hot enough, the metal is pulled forward so that the back ends which were under the counterarch may be heated in the open space indicated, and when heating short metal only the open space at the front end is used.

Another great fault in this type of furnace lies in the formation of the bed (D) and bottom flue (B), as owing to the thickness of the bed over the flue and the solid brickwork at the sides no appreciable heat can be imparted to the metal from the bottom, and

An important feature of this furnace, as regards its utility and efficiency, is its adaptability to be worked equally well from either or both ends, which gives it a decided advantage over the end fired furnaces (more especially in long furnaces), as when the end fired furnace is not employed with long metal, at least two thirds of the available heating space is useless for reasons previously given, and because men cannot handle tools enough to put in and remove the short metal from the back end, whereas the side fired furnace may be loaded with long metal from either end, or with short metal from both ends, as desired, and constantly worked to its full capacity, thus saving labor, time, fuel and space.

Where it appears impracticable to work side fired fur-

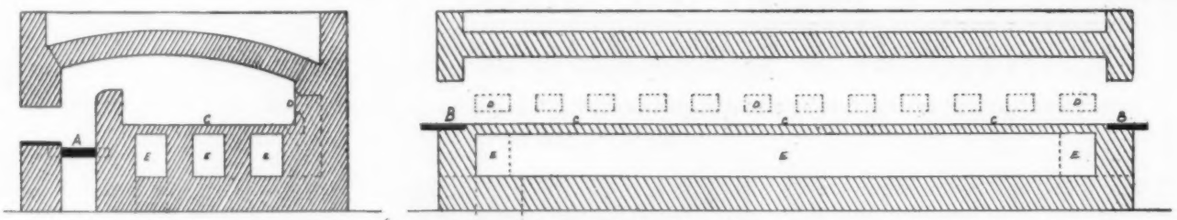


FIG. 2. A PLAN OF ANNEALING FURNACE AS IT SHOULD BE BUILT.

with so short and comparatively cool a flue these furnaces are responsible for the emission of the dense smoke out of the stacks, of which all may justly complain, and not only the emission of so much smoke being a nuisance to the neighborhood, but it is a clear indication that the fuel is being wasted. This is borne out by results, as the amount of fuel consumed in these furnaces is enormous. This is chiefly due to the fact that no advantage can be obtained with the damper, as on account of the fire being so far away from its work it is necessary to have the draught flue continuously open in order to induce the heat towards the working door end. This state of affairs results in rapid consumption and imperfect combustion going on whilst the heat generated is misapplied and wasted.

Fig. 2 illustrates the modern type of "open" annealing furnace. The fires (A) are as near as possible to the working door (B) and the metal being heated. There is no counterarch in this furnace, the flame passing immediately over the metal on the bed (C), down the side flues (D) and into the bottom flues (E), running parallel with the fires the entire length of the chamber. In a 20-foot furnace these bottom flues would be 60 feet long, and as they are covered with special slab bricks 2½ to 4 ins. thick through which the heat readily passes and is transmitted to the metal over the whole area. By this system of heating at top, bottom and sides, the perfectly uniform heating of the metal is assured and every particle of heat is used to the best advantage, as the smoke in passing through the long hot flues is burnt up, therefore giving a great amount of heat to the bottom, and rendering these furnaces practically smokeless.

naces owing to the situation of coal wharf and furnaces in working relation with the rolls, etc., existing and fired furnaces can be altered and considerably improved by replacing the solid counterarches with sectional arches only one inch thick. and reconstructing the bed with an arrangement of flues somewhat similar in design and effect to those in the side fired furnace illustrated.

Fig. 3 illustrates a modern type of "closed" annealing muffle. This is chiefly used for getting down and finishing the better classes of metals. This muffle is fired at both sides (A), and the flames pass up the sides and along the top of the chamber (B), into the flue (C), which forms a hot belt around the chamber door, after which it passes along the flues (D), which are covered with special slab bricks forming the bed of the muffle, and thence to the chimney. In this type muffle a very uniform heat can

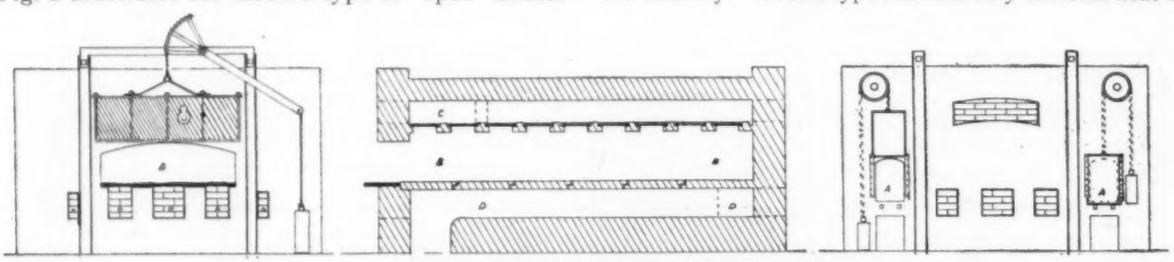


FIG. 3. A MODERN TYPE OF CLOSED ANNEALING FURNACE.

be obtained at any desired temperature within a very short time, as the inner chamber is built with specially designed bricks, which quickly transmit the heat without admitting the flames or gases, which are detrimental to the surface of the metal being annealed. These bricks are particularly suitable for annealing furnaces and muffles, as they are very strong and durable and at the same time are thin, so that the heat has not much thickness to penetrate.

These muffles are absolutely reliable and efficient in working, whilst at the same time the consumption of fuel is kept low, and compare exceptionally well with any other type of close annealing muffle.

Fig. 4 illustrates an "open" type annealing furnace of a smaller size suitable for annealing stampings and general brass foundry work. This furnace is fired at the side (A) from either end; the flame passes over the work on bed (B) down the side flues (C) into the bottom

flue (D) and thence to the chimney. In this furnace a good heat may be quickly obtained and also maintained with an extremely small quantity of fuel, so that it is particularly suitable for irregular work, as it can be got up to a working heat in two hours.

Fig. 5 illustrates a "closed" muffle suitable for similar

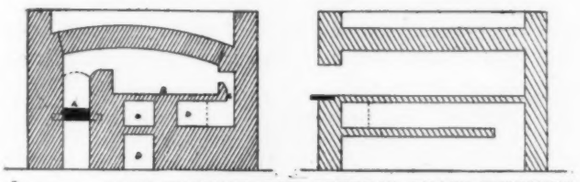


FIG. 4. OPEN FURNACE FOR GENERAL BRASS FOUNDRY WORK, ETC.

sized work as the above. This muffle is fired at the bottom (A) from either end; the flame passes along the bottom flues (B) up into the side flues (C) to the end of chamber (D), then up over the counterarch (E) and to the chimney through (F). It will be seen therefore that the flame and heat has to pass completely round the closed annealing chamber, and in consequence a good even temperature is obtained. Although more fuel is required in this type than in the "open" furnace, the metal comes out a good color, very clean and well annealed, and most users contend that the "closed" muffle more than compensates for the extra amount of fuel required by the amount of pickling and cleaning it saves, and also by the superior color and finish obtained.

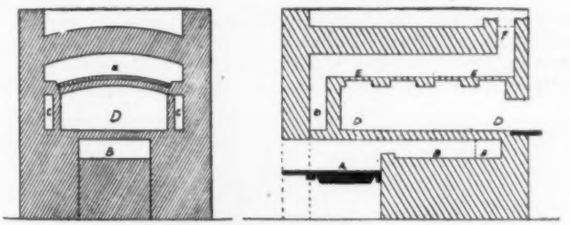


FIG. 5. CLOSED MUFFLE SUITABLE FOR STAMPING, ETC.

The writer hopes that by this brief description of a few of the types of annealing furnaces used in the metal trades those interested may derive some benefit therefrom, and that it may act as an incentive to those firms still using the old and inefficient type furnaces, to replace them with the modern and more efficient furnaces described, as the outlay involved will be speedily returned by the fuel saved and the increased output obtained.

POLISHING NICKEL AND ALUMINUM.

By Dr. Robert Grunshaw.

Often one runs up against unforeseen difficulties in practice—for instance, in polishing nickel and aluminum. Very frequently, in this matter, the trouble lies in the use of improper polishing tools or methods; also in the wrong choice of polishing material. The Austrian engineer, Otto Hildebrand, calls attention to the necessity of employing, for the different metals and other materials, special polishing disks, according to the material to be worked; felt, wood, leather and cloth are called for, according to the material to be polished. Very often, in using hard disks, too much pressure is used; this is particularly dangerous in polishing sheet metal, for the pressure generates heat, and the result is that the heated metal often wrinkles. This difficulty is particularly frequent where leather disks are used; and the use of these for polishing thin sheet is specially to be avoided.

When it comes to polishing materials cast in sand, or articles that have sunken places in their surface, polishing-disks are not suitable; rotating brushes should be used. In the case of sand-cast articles, it is often necessary to prepare the metal either by mechanical or by chemical methods for the polishing proper. For mechanical preparation, scratch-brushing with circular brushes of fine or coarse brass or steel wire are the thing; but if the articles have very deep recesses, then the sand blast is called for. Where the pieces are to be plated with nickel, it is usual to polish them before plating; they then come from the bath with an already-polished nickel surface. This has the great advantage that only a very thin nickel coating is necessary, and the polishing is much more easy. But nowadays many articles are made of nickel sheet, and must be polished after manufacture; this must be done with a special paste. One of the best receipts therefor calls for eight parts of stearin, 32 of ship's tallow, two of stearin oil and 48 of very finely pulverized or precipitated chalk, used with a cloth polishing-disk.

To polish sheet nickel plates, the cloth polishing-disk is not suitable; for these, felt disks are recommended. These avoid the generation of heat, and also take in a good supply of the polishing material; and further, are sufficiently soft and flexible. As material to obtain a very high polish, there may be used the paste above mentioned; but where it is desirable to do the polishing in two stages, the first paste should be considerably coarser; that is, should have coarser chalk, or even tripoli, therein. In this instance, naturally, the felt disk should be suitably coarse. After the first polishing is done, every particle of the coarser polishing material must be carefully removed, else the work of the finer paste will be brought to nought.

Polishing aluminum is often attended with especial difficulty; but as this material is becoming used more and more, on account of its many and excellent qualities, it is well to know what is fit to use, and what is not. In the first place, the structure of the material calls for a different polishing paste from that proper for nickel or other materials. It has been found in practice that for use on this metal a paste of one part of stearic acid and one of fuller's earth with six parts of tripoli is the best. Where very highly polished surfaces are desired, this paste is used with a leather or cloth disk. It is well, however, after employing this material, to use crocus, which gives a still better effect.

With articles cast in sand it is desirable to use a very rapidly running circular steel wire brush, the fineness of which depends on the degree of polish desired. Such brushes have the advantage that they remove the yellow streaks often caused by running the metal too hot; further, the grain which they produce is very handsome. For polishing on the lathe there is used flannel, filled with a mixture of vaseline and kerosene oil; or a solution of 40 grams of powdered borax in one liter of hot water, with a little ammonia therein. The flannel is held with the hand against the rapidly rotating article and moistened with the other hand at a rate corresponding to the speed of the lathe. As soon as the polishing is completed the article should be cleaned from fat and dried with benzine or alcohol.

THE ART OF DESIGNING.*

Methods of Application.

By A. F. Saunders.†

"Understand this clearly; you can teach a man to draw a straight line and to cut one; to strike a curved line and to carve it; and to copy and carve any number of given lines or forms with admirable speed and precision . . . . but if you ask him to think about any of those forms, to consider if he cannot find any better in his own head, he stops his execution, becomes hesitating, he thinks, and ten to one he thinks wrong; ten to one he makes a mistake in the first touch he gives his work as a thinking being."

John Ruskin.

A thorough understanding of the various methods of applying decoration to form is of vast importance to the student craftsman, and most necessary if his productions are to be practically useful as well as ornamental. He should first have a thorough knowledge and appreciation of his material, its nature and possibilities as a medium of expression, as well as perfect mastery over his various tools. The true craftsman feels his material as he feels his subject, and is able to think in the material as the author thinks in words. To fully understand and ap-

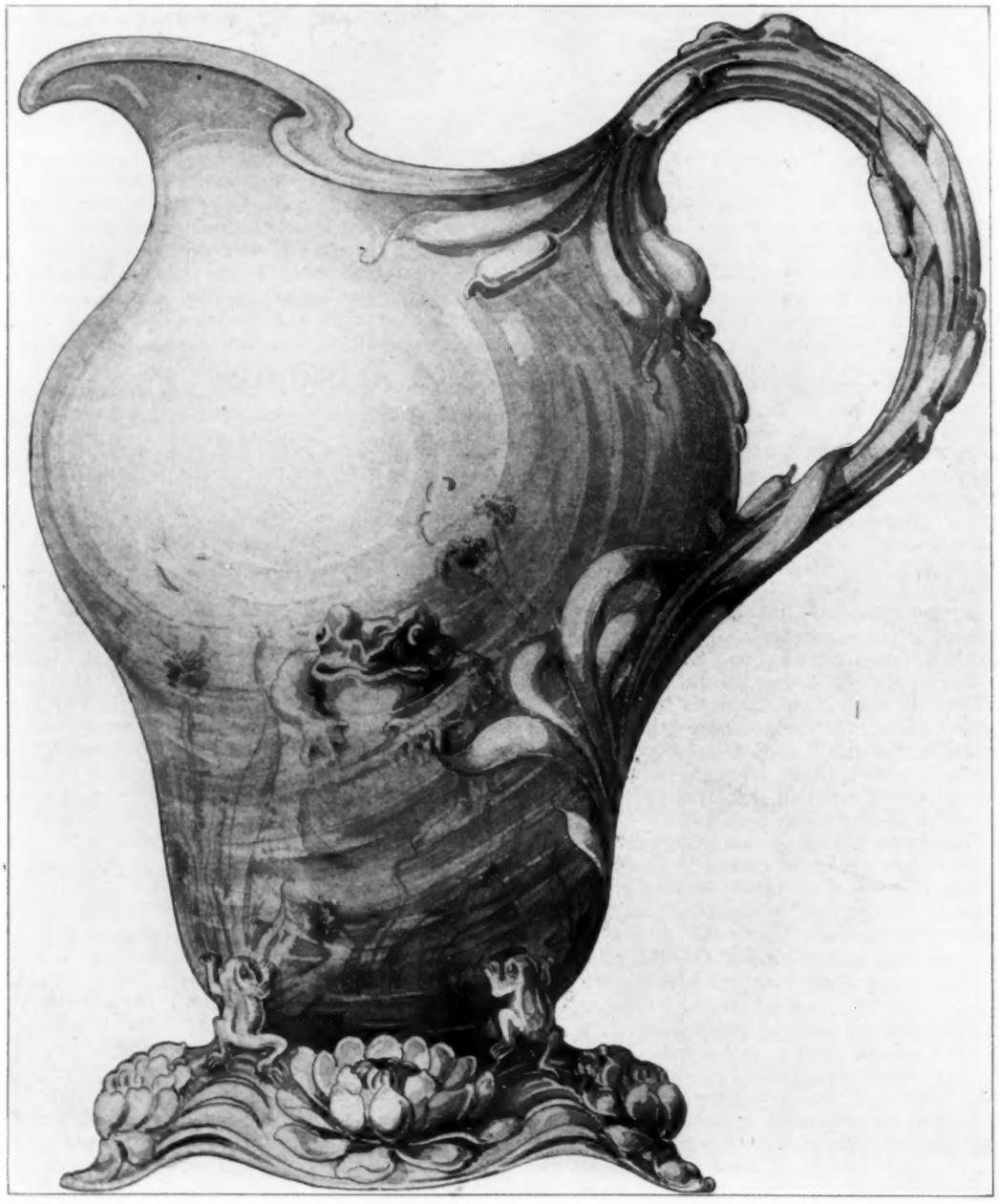


FIG. 1. SILVER WATER PITCHER, INCORPORATING SPINNING, REPOUSSE, CHASEING AND CASTING.

*This is the third article by Mr. Saunders on this subject; the first and second appeared in The Metal Industry, July and October, 1909.

†Designer, Benedict Manufacturing Company, Syracuse, N. Y.

preciate the aesthetic possibilities of the various metals it is also necessary that he should well understand their individual characteristics and feel their special beauties in which is found something that is not in any other material. Certainly he should not expect or demand something of them which they cannot logically give. This is a principle often misunderstood.

The nature of a material, its composition, grain and manner of reflecting light all demand careful study, individual treatment and handling. Thus, in silver the work is carried further than in copper; in gold further than in silver. There is also an adaptation that must be realized between the conception and the execution; the adaptation to the material, which must be complete and perfect in order to give the work its highest artistic expression. Next to an understanding of the material comes the proper arrangement and distribution of ornament. All parts of a design are not equally important. One must know where to emphasize and where to conceal. Manifestly there are parts of less importance artistically than the object itself. For example, the base supporting a cup, vase, teapot, etc., overdecoration of which would detract from the effect of the real object. It is one of the few rules of designing to diminish what are called points of force.

FIG. 2. BLACK COFFEE POT, INCORPORATING SPINNING, FLAT CHASEING AND ENGRAVING.

The application of decoration I divide into two classes; hand work and machine. Obviously the first named method is the only natural and truly aesthetic one. Any mechanical process suppresses the close relationship which constantly exists between the craftsman and his material. The material no longer rules the tool, as the machine restricts its possibilities, thereby producing objects absolutely inferior. The constant contact with the material in hand work counsels and teaches at every turn throughout the entire execution, from the first rough outline to the finishing stroke; but the modern metal craftsman must consider the cost of production and his wares must be reasonably priced to be salable. He must, therefore, utilize every available process or method that will admit an economical output. It thus becomes a problem of combining hand and machine work more or less, based on good designs and true principles where possible. There seems no good reason why our commercial metal work should lack pure outline, good proportion and pleasing decoration.

Assuming that the student craftsman is familiar with the various methods of application, both by hand and machine, what forms are best suited to the various processes? Or, rather, let us study which process adapts itself best to the various forms, beginning with hand methods such as repousse and flat chasing, etching, engraving, and enameling. I can, perhaps, best illustrate by referring to the several cuts shown in this article (Fig. 1). Such shapes or outlines require ornament treated in high, bold relief, such as repousse, chasing or casting.

Fig. 2. Severe in outline and is best suited for etching, flat chasing, engraving or enameling if colored effects are desired. All flat surfaces should have a sufficient amount of flatness in their ornamentation, so as not to destroy their quality of flatness. It is also important to understand that for metal work the natural forms or motives employed should be generalized. That is to say, while you cannot study too closely the growth and characteristic shape of the leaves, buds or flowers, you must avoid exact imitation of accidental forms or minute details. Be as minute as you please in your pencil studies, but when you translate to the actual work learn what to leave out; seek form typical of the subject yet suitable to the material.

As to the mechanical methods in shop use today, perhaps the most important to the metal worker are drawing and spinning, as they have to do with the foundation, the form, thus meaning a big saving over hammering or shaping by hand, and for all practical purposes answering just as well. Yet it is for the craftsman to bear in mind that the main point must not be lost, that while a great amount of his individuality is eliminated in the work of the machine, nevertheless much can be made up by good outline and appropriate decoration, judiciously applied.

Other mechanical methods such as stamping and casting, while they are imitations and lack true aesthetic quality, representing rather the skill of the die cutter and modeler, however, become of great value for ornamental purposes if used with good judgment, especially when combined with a little touch of hand work, such as chasing, etching or engraving, thus adding a little personality to the object.

It has been my aim throughout these several articles to impress upon the craftsman the importance of an appreciation of the true principles of design and craftsmanship, rather than an elaborate course on any one principle or process. Neither has it been my purpose to give a course of instruction in design or to explain in detail each operation of production; but rather to aid him to think intelligently in his work and cultivate a spirit of interest, to urge him to study the possibilities and demands of his material and tools, thus making him more valuable both to himself and his craft. Be true to your work and your work will be true to you.

NEW ENGLISH CRAFT SCHOOL.

[From United States Consul Albert Halstead, Birmingham, England.]

In the city of Wolverhampton a new craft school has been opened connected with the School of Art. Rooms have been equipped for instruction in embroidery, repousse metal work, enameling, jewelry, ornamental ironwork, leather work, practical stenciling, pottery, wood and stone carving, painting and decorating. A different department will teach each craft.

ELECTRIC POWER REQUIRED TO MELT METALS.*

By Joseph W. Richards.†

JOSEPH W. RICHARDS, PH.D.

A university professor is often put down as a theoretical person who deals with figures rather than with facts. While perhaps everyone here knows more about the practical operations of making metal casting than I do, yet I will spend a little of your time trying to persuade you that some of the figures which I will present correspond with the fact and are often very useful things to know and to use. A practical man learns by experience and regulates his practice by "rule of thumb." If an operation does not go as it should, he first tries this remedy, then that, and by force of perseverance usually finds his way correctly. If a new process is to be worked out, he courageously fires away at it, trying always to improve on his first crude results, and by his patience and practical skill often comes out of it very well. This is the natural way for progressing in any industry, and the men who follow it and succeed command our respect and admiration.

After experience has brought an industry, or any particular operation, as far as it can, further progress depends upon a more refined method of getting at the facts involved. At this point it becomes necessary to study the mechanical, physical, thermal and chemical principles involved. This study can be best done in the laboratory, away from the turmoil of the shop, yet supplemented by careful observations and measurements made in the works. This study will often lay bare the principles of operation so clearly and give such an intimate knowledge of the why and wherefore of the whole operation that the way to further improvement is readily seen. This is the period to which many metallurgical industries have attained, and you all know operations illustrating the analysis just given. While this scientific study of an operation never makes operative skill and experience superfluous, but makes them more effective, yet I believe that no industrial operation is of so peculiar or mysterious a nature that it cannot profit by being systematically studied and scientifically investigated.

To make a specific application, let me illustrate by citing the melting of brass. We put the metal into a crucible and the crucible into a fire, and after a while we have the molten metal desired. After centuries of experience, have we reached the best possible result, the highest full efficiency? We may think we have, until a bright inventor comes along with an improved melting furnace which melts 50 per cent. more brass for a given quantity of fuel. Then we commence to ask ourselves, "What is the greatest efficiency possible?" Or another inventor comes along with an electric furnace for melting brass, using no fuel at all, and we say to ourselves: "Is there any connection between the heat required to melt brass and the electrical energy? How can we tell the efficiency of our electric furnace?" Such questions and problems deal with the *quantitative* side of metallurgy as distinguished from its *qualitative* side. As long as no exact scientific data are at hand, and no calculations of efficiency can be made, the industry is still in the infancy of metallurgical development. All industrial operations reach their highest development when they are subjected to calculation, and a numerical comparison of practical results with the theoretically possible.

In melting metals a practical man can tell from his experience how much coke it takes to melt a ton of given metal and bring it to the proper temperature for casting, in a given furnace. Another metallurgist can tell us how much oil would be required for another type of furnace, and we could thus roughly compare the efficiency of these furnaces with each other; but the comparison would be rather upon the basis of cost than on the absolute scale of how near to the theoretically possible each was working. If a third man reported how much electric current he used (kilowatt-hours) to melt a ton of the same metal in an electric furnace, the comparison with the first, except as to cost, is impossible on the fuel basis. In such cases the absolute efficiency of each operation, in terms of the *theoretically possible,* is the only satisfactory way of getting really valuable information as to what is being accomplished and as to what may be further accomplished. The proper basis for real information in this field lies in the measurement of maximum calorific powers (heating values) of the different fuels used. The knowledge of the calorific value of electrical energy, and the measurement of the heat units in a known weight of each of the various metals and alloys when in the proper molten condition for casting.

The calorific powers of the fuels are determined in the laboratory by their complete combustion in a calorimeter, and the heat measured in water units. Thus we know that pure carbon (dry charcoal) has a calorific power of 8,100, which means that one kilogram of it in burning will raise the temperature of 8,100 kilograms of water one degree centigrade, or that one pound will raise the temperature of 8,100 pounds of water one degree centigrade, or that one pound will raise the temperature of 14,580 pounds of water one degree Fahrenheit (14,580 B. t. u.). The kilogram units are used in all scientific work in Europe and America. They are also used in practice wherever the metric system is used. Pound units and centigrade degrees give the same *numbers,* and therefore may be used if anyone prefers; but the pound Fahrenheit (B. t. u.) units have to be expressed in entirely different numbers, and I strongly urge their being dropped from your scientific investigations and calculations. I would, as a general proposition, strongly recommend that every establishment using much fuel have a good calorimeter in its laboratory to determine regularly the heating value of the fuel it buys and uses. Much money can be saved by the information thus obtained, and the data are indispensable for finding out how efficiently the furnaces are working.

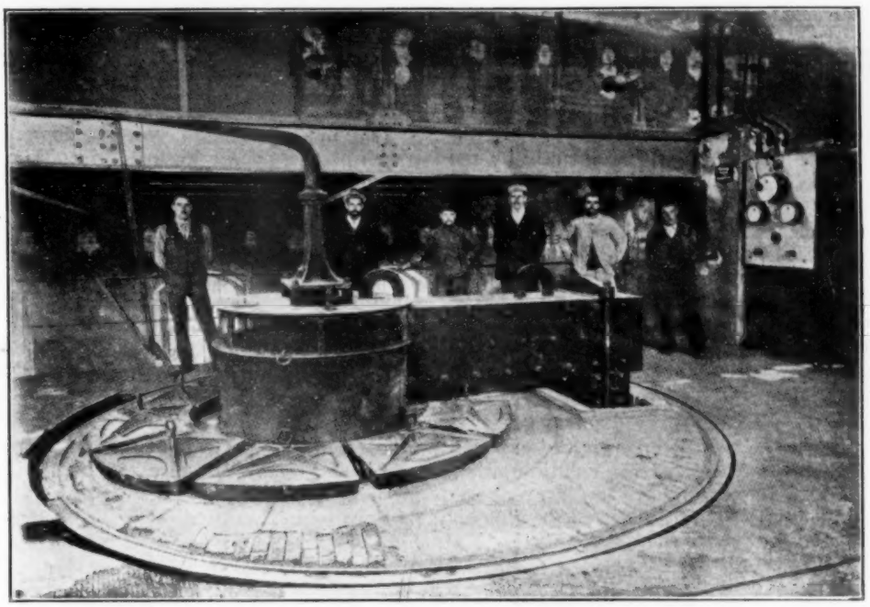
The heat value of electric energy is known with accuracy. One kilowatt-hour furnishes 860 kilogram heat units (calories), if entirely converted into heat energy, without loss. This is 1,897 pound-calories or 3,414

*Address at convention of the American Brass Foundrymen's Association, Detroit, June, 1910.

†Professor of Metallurgy Lehigh University, South Bethlehem, Pa.

B. t. u. One English horse-power-hour is nearly three-fourths of this: 642 calories, 1,416 pound-calories, 2,549 B. t. u.; one metric horse-power is 635 calories, 1,400 pound calories, or 2,520 B. t. u. The actual heat content of a melted metal can be measured experimentally by pouring some of it into water in a calorimeter and measuring the heat given out in cooling to solid metal at the ordinary temperature. This is best expressed in calories per kilogram of metal, or pound-calories per pound of metal—numerically the same figure. B. t. u. per pound would be 1.8 times that number. This quantity of heat represents the useful effect of your furnace, the part of

Zinc	419	23	68	73
Silver	962	24	89	96
Cadmium	322	13	32	34
Tin	232	14	28	29
Antimony	632	40	74	78
Tellurium	455	19	46	49
Iridium	1,950	28	113	123
Platinum	1,775	24	89	102
Gold	1,054	16	51	55
Thallium	290	6	16	17
Lead	326	4	16	17
Bismuth	267	12	21	22



450 K. W. ROCHLING AND RODENHAUSER COMBINATION INDUCTION FURNACE, MANUFACTURED BY THE AMERICAN ELECTRIC FURNACE COMPANY, N. Y.

the heat of combustion of the fuel which has been put just where it was needed—the usefully applied heat.

We must now admit that these experimental data, so useful for estimating the efficiency of melting furnaces, are scarce. We need to have a great deal of such experimental work done—in research laboratories and private plants—and the results freely published for the mutual benefit of all. By assuming that a metal needs to be heated for practical purposes 10 per cent. above its melting point (on a very large scale, 5 per cent. might answer), we can construct the following table of calories necessary to put one kilogram of metal (pound-calories per pound) in order to melt and superheat it to the point needed for casting:

	C° Melting Point	Latent Heat of Fusion	Heat in Melted Metal Just Melted	Heat in Melted Metal Superheated 10 per cent.
Lithium	180	73	242	257
Sodium	97	32	78	81
Magnesium	750	58	246	271
Aluminum	645	100	258	278
Silicon	1,430	128	555	622
Potassium	58	16	27	28
Calcium	780	53	186	202
Iron	1,600	69	336	368
Nickel	1,450	68	290	319
Cobalt	1,500	68	329	359
Copper	1,058	43	162	176

ALLOYS.

50 Tin	..	..	..	..
50 Lead	202	10	19	20
15 Tin	..	..	..	..
85 Copper	..	..	..	130
35 Zinc	..	..	..	..
65 Copper	..	..	..	130
Cast Iron	..	..	..	250
Steel	..	..	..	315

An application of our principles, by way of illustration, may be made to brass or bronze, containing 130 calories per kilogram (130 pound-calories per pound), when ready for pouring.

COKE NECESSARY: At a calorific power of 7,000 calories it would require 130 ÷ 7,000 = 0.019 kilograms per kilogram of bronze, at 100 per cent. efficiency of application of heat; or one pound of coke might melt 1 ÷ 0.019 = 54 lbs. of metal. If in practice we melt 10 lbs., our melting efficiency is 10 ÷ 64 = 0.18 per cent.

OIL NECESSARY: At a calorific power of 11,500 calories (20,700 B. t. u. per lb.), it would require, at an efficiency of 100 per cent., 130 ÷ 11,500 = 0.0113 kilograms; or 1 part of oil might melt 1 ÷ 0.0113 = 88 parts of alloy. If in practice it melts 15 times its weight, the thermal efficiency is 15 ÷ 88 = 0.17 = 17 per cent.

ELECTRIC POWER NECESSARY: To supply 130 calories requires theoretically, allowing for no loss, 130 ÷ 860 = 0.15 kilowatt-hour, or 0.20 horse-power-hour; to melt 1 pound, requiring 130 pounds calories, would require

0.07 kilowatt-hour, or 0.09 horse-power-hour. Or 1 kilowatt-hour should melt 6.7 kilograms, or 14 pounds, at 100 per cent. efficiency. If 1 kilowatt-hour actually melts 3.3 kilograms, the thermal efficiency of the furnace is 50 per cent.

COMPARATIVE VALUES: If 1 lb. of coke melts 10 lbs. of metal, 1 of oil melts 15 lbs.; and 1 horse-power-hour melts 5.5 lbs., the relative values of these melting agents are:

1 lb. coke = 0.67 lb. oil = 1.8 h. p. hours;

or

Coke at $4.00 per ton = oil at $6.00 per ton = power at $12.25 per h. p. year.

From the foregoing figures it would appear that coke would be everywhere the cheaper; but in Norway, with coke costing $6.00 per ton, and electric power not over $10.00 per h. p. year, the electric furnace is the cheaper. Moreover, when the cost of crucibles destroyed, labor and deterioration of metal, is taken into account, the electric furnace may be the cheaper in many other localities than Norway. Besides, some electric furnaces are working at efficiencies nearer to 75 per cent. than to 50.

I hope to have convinced you that quantitative metallurgy and calculations of efficiency of furnace operations against the theoretically possible are attractive and useful subjects and worthy the best attention of each and all.

THE PRODUCTION OF OLIVE GREEN VERDE BRONZE ON BRASS.

By CHARLES H. PROCTOR.

The production of this rich antique finish can be accomplished by two different methods, the first entirely by the pigment method, the second by a combination of an acid green solution and pigment. This finish always gives better results on articles that have high reliefs. The green, which should consist of a light bluish green in the deep depressions or background, gives the contrasting effect to the dark olive green of the high relief parts. Moldings made from sheet brass extrusion metal or cast brass or tubing with deep depressions are usually employed for this and kindred finishes.

To produce this finish by the pigment method proceed as follows: Cleanse the surface in the usual manner, if possible sand blast the surface, then go over the exposed surface with an ammonia copper oxidizing solution either with a sponge or brush if the articles are too large or too long for immersion. This solution consists of the following proportions.

Ammonia 26%	½ gal.
Carbonate of copper	8 ozs.
Carbonate of sodium (Sal Soda)	4 ozs.
Water	1 pint.

The solution works best warm. The only purpose this fulfils is to darken the surface to give the proper tone to the green. After the surface has been darkened as stated, wash with clean water, then dry out with boiling water and maple sawdust in the regular manner. When dry the surface should be lacquered with a mixture of one part white French varnish cut in denatured alcohol and one part of fusel oil and amyl acetate previously mixed. This acts as a size, and the coating should be applied by a Fitch varnish brush, dip or spray. The surface should dry for five or ten minutes with a slow heat.

The second operation is to prepare the green pigment which consists of mixing dry white zinc or lead with a little light chrome green and just a slight trace of soluble blue, which are also dry powders. The proper tone will have to be developed by a little experiment. Dissolve the pigment in turpentine to which is added a very small amount of turpentine copal varnish or hard oil finish. Care must be taken in adding the varnish, otherwise the surface will have a shiny or painted tone instead of the lustreless or opaque surface. Paint this on the lacquered surface with a half inch camel's hair or badger's hair brush. The operator need not be very particular in this operation. The only results required is to have the green pigment in the crevices or background. The articles should be placed on the lacquer heater for ten or fifteen minutes, which will soften the lacquered surface so the pigment will penetrate and cling to the metal. The pigment should now be a flat or opaque surface. Remove and allow to dry in the air for an hour.

The next operation consists of producing the olive green bronze on the high lights. To produce this effect, mix equal portions of refined lampblack or ivory black and chrome yellow; incorporate the two pigments so they will be well combined. Now prepare a mixture of turpentine with a very little turpentine copal varnish or hard oil finish. Use a half inch round bristle brush, which should not be too stiff or the bristles too long. Moisten the tip of the brush by applying a little of the turpentine mixture with the fingers or use a piece of felt half an inch thick for the purpose of moistening. Then take a little of the mixed black and yellow and rub into the brush well. Try this on a piece of iron or wood, or to get the exact tone required, coat a piece of brass as a sample with the requisite green. Be sure the brush is nearly dry, then go over the high lights with a backward and forward motion, which will cause the olive green to cling to the high lights and give the metallic tone. When this has been accomplished the articles should be placed on the lacquer heater for a short time. Then remove and allow to dry well, which will take a half hour or more. When hard, rub up with a soft cloth or brush up with a hand bristle brush. If the edges of the high lights are to show the brass, a little vigorous brushing will wear away the pigment on the edges, giving this result. This concludes the pigment method.

To produce the same results with the aid of an acid green, prepare the brass surface by sand blasting or acid dipping, then deaden the surface with pumice stone and water, using a brass wire scratch brush for the purpose. Now prepare the following mixture:

Sal Ammoniac (Ammonium Chloride)	2 ozs.
Common Salt	2 ozs.
Aqua Ammonia	4 ozs.
Water	1 gal.

The brass surface does not require the ammonia copper dip in connection with this method. Brush the articles over with the above mixture, using a painter's sash brush for the purpose, avoiding an excess of the mixture, or immerse the articles, if not too large, and drain well; let the surface dry; a bluish green will be the result. It may be necessary to go over the surface a second or third time to get a sufficient green tone. When this has been accomplished, dry the articles and lacquer with a flat lacquer, which may be done in either of the ways previously described. When the lacquer surface is dry, apply the olive green bronze in the manner before mentiond, finishing the surface afterwards in the same way as described for the pigment method.

In all new operations a little experimenting is required, especially in blending colors. In preparing the

pigment the addition of too much chrome green will produce a decided green tone or the addition of too much blue will give a green too bluish. In mixing the olive green an excess of yellow produces too light an olive, an excess of black too dark for the proper contrast. These methods give excellent results, producing an elegant finish for many articles, especially on antique work. The same methods prescribed with a variation of the pigments and the high ground colors will give an endless number of rich effects that can be used upon many articles adapted to contrast effect in art color work upon metals. The colors prescribed are the usual commercial dry colors and can be purchased at any first class paint store. To those unacquainted with the decoration of metals with pigments, the methods described in this article will prove interesting and will no doubt lead to an appreciation of the contrasting effects by the aid of color, even though the results be artificial instead of real.

THE MANUFACTURE OF WROUGHT BRASS

A Description of Modern Methods in the Production of Plate, Sheet, Rod, Wire and Tube.

(Continued from September.)

By L. J. Krom.

ANNEALING AND PICKLING.

The overhauled bars are heated in the muffle annealing furnace and are allowed to cool on the mill floor. The average time of annealing—that is, heating, cooling and pickling—is about two hours. It has been claimed that only certain mixtures of brass will admit of being water-quenched after coming out of the muffle, but as a general rule this is becoming more and more common practice. Leaded mixtures, however, will not permit of sudden cooling and usually all metal of this class is cooled slowly and protected from draught. After the metal is cold it is put into lead-lined tanks containing a mixture of sulphuric acid and water. This mixture is called "pickle" and is made up of 12 parts of water to one of acid. A good uniform strength for a brass pickle is from 10 to 12 degrees Baumé. The effect of this "pickle" is to dissolve the oxide of copper formed on the surface of the metal during the annealing process.

As the "pickle" is kept in the tank and used repeatedly it becomes more or less saturated with copper sulphate and consequently has to be freshened up with new acid in order to keep it in "pickling" condition.

When the pickle becomes so strong in dissolved metals that it refuses to act on the metal it is removed from the tank and the copper carried in solution as copper sulphate is recovered.

THE RECOVERY OF COPPER.

There are several methods for obtaining the copper from a saturated pickle solution. The copper may be thrown down or precipitated as spongy or cement copper by the simple addition to the solution of scrap iron in the shape of hoops or sheet. This is a simple and economical process, but it has its drawbacks. The cement copper is slimy and difficult to handle; it will also contain considerable iron, but as the cement copper has to be smelted to be obtained in a metallic state, this iron content is not at all a serious objection. A second method is to put the solution into a lead-lined tank and hang strips of lead or copper sheets into it for cathodes. The lining of the tank is connected to the positive wire of an electric circuit and the copper is deposited from the solution on to the cathode sheets as metallic copper. These cathodes can then be melted up and the copper used for making new brass. If lead cathodes are used they are first rubbed with graphite and the deposited copper can readily be stripped off and the cathodes used indefinitely. Where copper sheets are used they are remelted with the coat of copper and new ones are put in their place. This

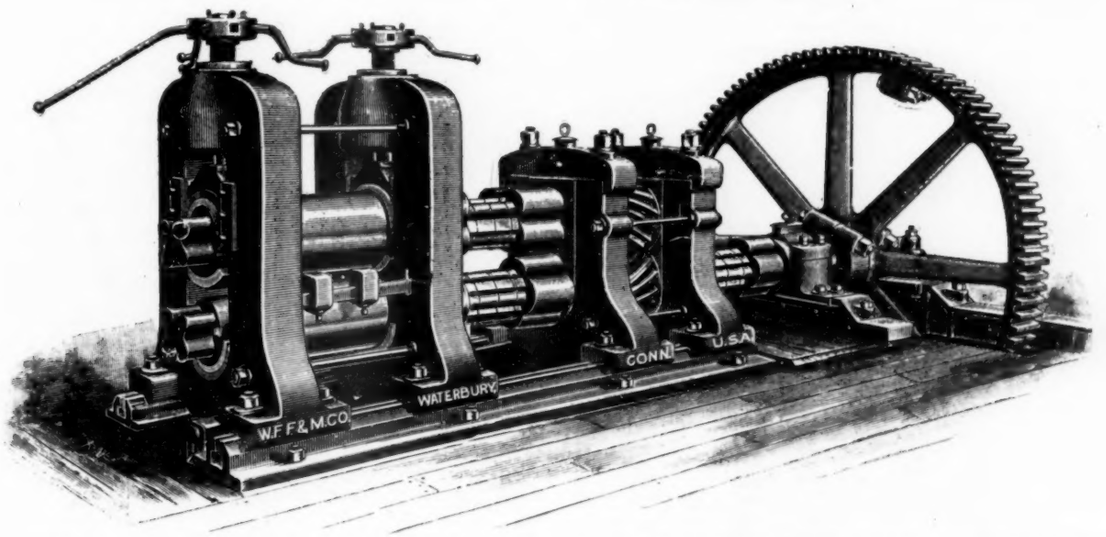


FIG. 9. GEAR DRIVEN 18 X 36 INCH SHEET BRASS ROLLING MILL. BUILT BY WATERBURY FARREL FOUNDRY & MACHINE COMPANY, WATERBURY, CONN.

process can be carried on continuously and the current expense is low. Were it not for the amount of zinc sulphate contained in a brass pickle the copper could be readily recovered by the copper sulphate crystallization process that is in use in many mills where pure copper is handled.

The pickling process of the annealed brass usually takes from 20 to 45 minutes and then the bars are immersed in clean running water, which rinses off the film of acid adhering to the surface of the metal. The brass is then ready for the continuation of the rolling operation. The second process of rolling that the

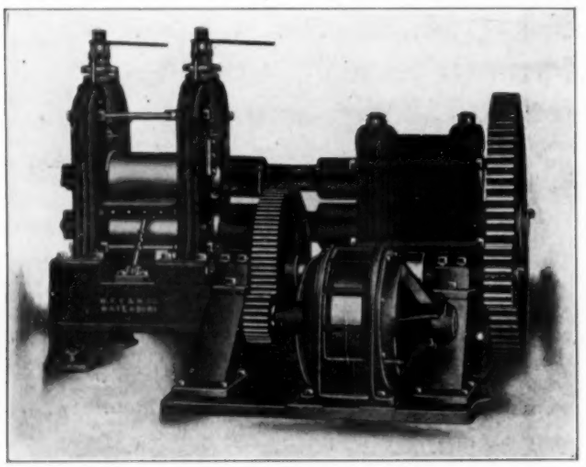


FIG. 10. MOTOR DRIVEN 12 X 20-INCH ROLLING MILL.

brass undergoes after "breaking down" is known as "running down" and "finishing" and these rolling reductions are broken up by frequent annealings in order to keep the metal sufficiently soft so as to prevent cracking and splitting.

These rolling operations are performed upon rolling mills of similar design, though not of quite such

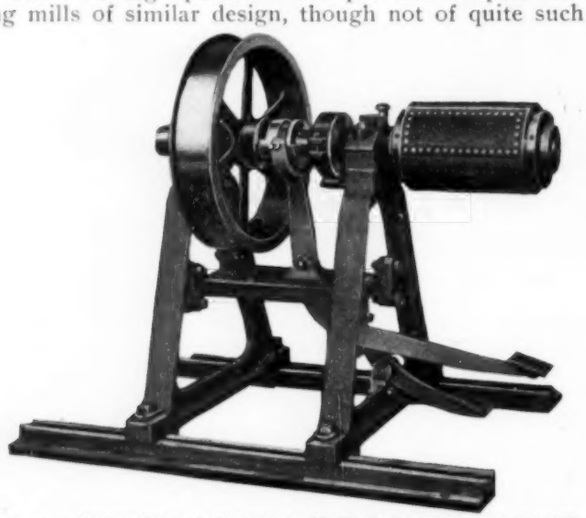


FIG. 11. SHEET METAL WINDER, MANUFACTURED BY WATERBURY MACHINE COMPANY, WATERBURY, CONN.

heavy construction, to the "breaking down" rolls. A pair of these rolls is shown in the cut Fig. 9; they may be motor driven or connected by gears to the main drive. The size of these rolls is usually 20 inches in diameter and they are made of chilled iron and are run at a speed of anywhere from 18 to 24 revolutions per minute. During the rolling of the brass quite a little heat is generated by the friction and to keep the temperature low some mills use oil of a light density on the rolls, but a good many use only water and this seems to be entirely satisfactory.

In all the rolling operations that are required to reduce a bar of brass to a "finished" size the amount of reduction or "pinch" varies with the width of the bar and the mixture of which it is made.

The rolling of sheet brass is done by a crew of men three in number. The roller, who has entire supervision over the rolling mill and its operation, has to keep the rolls in good condition as to the rolling qualities. He must see that the face of the rolls are kept ground smooth and are in such shape as to insure an even and smooth surface to the rolled brass. His judgment is brought into action as to which side to roll on to avoid "tracking" and he must know his metal sufficiently well to be able to judge of pinches, etc., and he is responsible for the gauge of the rolled metal. The roller has two helpers, one who attends to the pickling and washing and keeps the metal ready for the roller. The other helper is known as a "blocker" and he grasps the end of the bar as it comes from the rolls and wraps it around the block of a machine shown in fig. 11, known as the winder. This machine winds up the brass into a tight coil and runs as fast as the rolls. When the strip of brass is all through the rolls the machine automatically releases the coil and it is drawn off by the blocker and is then ready for reannealing and subsequent operation.

(To be continued.)

METALS IN AIRSHIPS.

The aviation meet at Belmont Park last month afforded an excellent opportunity for the observer to note the rapid development in the use of metals in the manufacture of aeroplanes. Aluminum, of course, is employed quite extensively, we find this metal used for motor crank cases, gear cases, water jackets, manifold inlet pipes and certain parts of the pump. The radiators are made of square and round brass tubing and brass and copper is also employed for the gasolene tanks and numerous other parts that are ordinarily made of iron and steel. The high prices obtained for the engines of these air craft enables the makers to use lavishly the most high-priced of metals, thus furnishing a mechanism of extreme durability and of appearance most pleasing to the eye. The cost of a Gnome 8-cylinder rotary engine being between four and five thousand dollars. A full description of the part taken by metals in airships was printed in THE METAL INDUSTRY for November, 1909.

WELLMAN'S USE OF METALS.

During the month of October the daily and weekly papers abounded with a description of Walter Wellman's attempted voyage across the Atlantic Ocean in a dirigible balloon. Mr. Wellman did not get more than a few hundred miles from the coast, but covered 1,008 miles in his zig-zag course. Mr. Wellman first became known to the readers of this journal through the November, 1894, number of The Aluminum World, in which was published a description of the aluminum boats, with the aid of which he expected to reach the North Pole.

CATALOGUES WANTED IN SOUTH AFRICA.

The American Consulate at Durban, Natal, South Africa, Edwin S. Cunningham reports that his office, located in the Club Arcade, Durban, has a reading room of trade journals and catalogues, which reading room is at the disposal at any time of the merchants of the country. The consul also sends out periodically, catalogues to prospective buyers. Manufacturers are requested to send more catalogues.

COAL VERSUS BY-PRODUCT COKE IN THE BRASS FOUNDRY.

W. R. DEAN. *

W. R. DEAN.

To the brass founder living near the coke centers, where good 72-hour coke is handy at a reasonable price, the coke and coal question is not so interesting; but to the founder living away from such centers the question often arises as to which is the most economical to use. One may be handy to a gas house, and be able to get by-product coke at a very reasonable price, and often wonder if it could not be used to more advantage than hard coal. Some time ago I carried on experiments with gas-house coke and hard coal to determine which is the best and chepest to use. Thinking the readers of THE METAL INDUSTRY might be interested I will give my results and conclusions.

After trying different kinds of coal, I found that Lehigh was the hardest, freer from slate, and contained the most carbon. The size depends upon the size of crucible used, and the size of the furnace. The furnaces I used took a crucible up to a No. 70, and gave the best results with egg coal. A coal for a brass foundry should be free from slate, hard and shiny. A dull coal is soft, low in carbon, and contains a high percentage of sulphur and ash, etc. A good free burning coal should be of about the following composition:

	Per Cent.
Carbon	91.5
Hydrogen	3.5
Nitrogen	0.3
Sulphur	0.6
Oxygen	2.6
Ash and Water	1.5
Total	100.0

Before going into the advantages and disadvantages of coal and coke it might be well to explain the differences between 72-hour and gas-house coke. This might briefly be explained by saying that gas-house coke is lower in carbon; but for the benefit of the readers who have never studied the composition of coke a brief explanation will help them to understand more fully.

The best cokes made as a direct product are produced from a good grade of soft coal, fairly high in carbon, and are made with the express purpose of retaining all the carbon in the coke, and eliminating as much of the impurities as possible. A good soft coal will show about the following analysis:

No. 1 sample.		Per Cent.
Volatile matter (38 per cent. sulphur)		40.95
Elements going to make coke:		
Carbon	52.48	
Sulphur	.20	
Ash	1.97—	54.65
Water expelled at 212 degs. Fahr.		4.40
		100.00

No. 2 sample.		Per Cent.
Volatile matter (gas, oil, tar)		30.10
Elements going to make coke:		
Fixed carbon	67.00	
Sulphur	.10	
Ash	.10—68.10	
Water	1.80	
		100.00

The coke from No. 2 sample will give approximately the following analysis:

		Per Cent.
Fixed carbon	67.00	98.383
Sulphur	.10	.147
Ash	1.00	1.470

This is the analysis obtained from selected samples, but when you buy your coke and analyze it you will find the coke will show about the following composition:

Carbon	91.97	to	94.00
Moisture	.50	to	.50
Ash	6.60	to	5.00
Sulphur	.93	to	.50
	100.00		100.00

Some cokes will show less carbon and less sulphur, but more ash and water. This is sometimes better, as sulphur raises havoc with the crucible and firebrick. Carbon is the essential thing in coke; therefore high carbon coke is necessary to accomplish the best results.

GAS HOUSE COKE.

Gas-house coke is the by-product of gas making. Some of the carbon from the soft coal unites with the hydrogen gas and passes off in the form of illuminating gas. Some of the carbon is retained in the coke and the following formula shows the proportion retained, along with the other ingredients. You will notice that the coke has a much lower percentage of carbon and higher percentage of ash and moisture.

	Per Cent.
Moisture	17.1
Ash	24.75
Sulphur	.60
Carbon	57.55

PROPERTIES OF 72-HOUR COKE.

Seventy-two hour coke should be hard and flinty, with a white crystalline appearance, and when you break a large piece it should have this same appearance clear through. It is better, as a rule, if the cells be coarse and the coke large, but there are some very good cokes that are rather small in size, but exceptionally hard and flinty in cell structure, which make up for the difference in size. You can buy coke that will show practically the same analysis as the best 72-hour cokes, but will not have this hard, flinty cell structure. It will crumble easily, and while it will generate a good heat for a time, it is not lasting.

Gas-house coke, it will be seen, has an analysis of about 57 to 60 fixed carbon, 24 per cent. ash, 16 per cent. moisture, and .6 to 1.5 sulphur, and sometimes higher. The cells are open and porus like a sponge. It is much softer than the other coke, and has usually a dark appearance, very much as though it had been smoked with coal smoke, which is really the cause of its appearance. Very often if you break a piece you will find a black, tarry mass of half burned coal in the center. This is the main trouble

*Expert Brass Founder.

with gas-house coke. The crushing strain is low on account of the ash, and the coke burns out quickly.

COAL.

With coal we have a fuel that is hard and flinty, high in carbon, solid, and has staying qualities. In the brass rolling mills, with few exceptions, coal is used on account of its staying qualities. In the rolling mills all the pots are ready at the same time, and when a melter pulls one he leaves the others uncovered, and the coal does not burn out, as would be the case with coke, but keeps the metal hot until it can be poured. In using gas-house coke alone the fires need constant attention to insure a quick, economical melt. The coke gives out a good quick heat, equal to 72-hour coke for a while, but it isn't near as lasting. The fires have to be coked up constantly. The coke won't last a half hour before the pots are to be lifted off the grate and coked up. The high percentage of ash is the cause of this. In using a small crucible, say a No. 20, the coke will sometimes last until the heat is nearly ready, but as we use a larger crucible the coke needs attention sooner.

COMPARATIVE COSTS OF MELTING.

With a good quality of hard coal the fuel lasts until the heat is ready. But the high cost of coal is against it. Coal at $7.00 per ton makes a melting cost from 24 to 34c per hundred pounds of metal melted, depending on the number of heats and character of the metal melted. With Connellsville coke melting can be done from 10 to 16c per one hundred pounds of metal, depending on the metal, etc. There are advantages to be derived from the use of gas-house coke over hard coal. Coke insures a quicker heat. If the furnace capacity with coal won't melt enough to pour the moulds, coke can be used. Then when sound castings are necessary for high tests of either strength or pressure, melting with coal may take so long that the metal is "soaked." There is such a thing as taking too long to melt metal, thus allowing it to absorb oxygen.

When attempting to melt with coke it is better to mix some coal with it. The bed should be half coal. This helps the fire to last longer, and still does not retard it to any great extent. In using coal a little coke helps to bring the melt down quicker.

The tarry mass in gas-house coke varies so that it is hard to tell just how long the coke will last. One lot may last a long while, while another will burn out quickly. This tarry mass, with the sulphur, raises havoc with the crucibles and firebrick. Crucibles will not last nearly as long with all gas-house coke as they will with coal, or even half coal and half coke. The coke lessens the life of the crucibles so much that unless coal takes too long and you are handicapped in getting enough heats, coal is the cheapest in the long run. This does not apply to Connellsville coke. If you can obtain good Connellsville coke at a reasonable price, do so by all means, as it is the best fuel for melting in the pit furnaces. When using by-product coke mix some good Lehigh coal with it, and you can take down your heat at a reasonable cost in good time to insure sound metal.

FORMULAS FOR ARTISTIC FINISHING OF METAL WORK AND JEWELRY*

DEVISED BY PRACTICAL PLATERS.

ROMAN COLOR ON GOLD JEWELRY

BY CHARLES A. STIEHLE.

In ancient times all jewelry was made only of fine gold or native gold, being the most precious metal, and its color being so different from all others, never changing, was not affected by the atmosphere, time or wearing of it. In later times it was discovered that it could be alloyed with silver and copper, making it cheaper and easier worked, and the fine gold color could be produced upon it by the aid of acids, called acid coloring, but it could not be made of a lower grade than 14 karat, as then the acid would affect it so much as to destroy it. The action of the acid was to remove from the surface the alloy, leaving a film of fine gold upon it. Still later the process of fire gilding was used, an amalgam of gold and mercury being rubbed upon the surface, the article then heated, driving off the mercury and leaving the gold upon the surface; but the process was slow, costly and very unhealthy for those employed upon it. Then with the improvements in dynamos came the art of electroplating, by which we can plate an article as light or as heavy as we wish, upon any karat gold or any other base metal.

The bath for gold plating can be made in several different ways as follows: By dissolving the gold directly into the bath by the use of the electric current and porous cup, or by transforming the gold into chloride, ammoniurett, or cyanide of gold. A good plating solution should contain, to one gallon of water and two grams of potassium cyanide, about twelve to fifteen pennyweights of gold. When using the bath it should be heated to 160 to 180 degrees, the strength of the current should be from one and a half to two and a half volts. The surface of the anode should always be about the same as the cathode, otherwise there will be more gold taken from the solution than can dissolve at the anode, thus weakening the solution, so that in time there will be very little gold in it, when it will give a poor color and very little deposit. After using a solution for some time, should the color become poor it will be found that the solution contains too little gold or too much cyanide and gold should be added in either the form of chloride, ammoniurett or cyanide of gold until up to the standard. When adding gold, cyanide must be added, but not much more than just enough to dissolve the additional gold. To illustrate the working of the solution, let us say we have one dozen of link buttons to color which are first polished to remove all scratches and washed out, they are then sandblasted to give a good even matt surface, then scratch-brushed, rinsed and should be kept under water all the time as they must never be allowed to get dry.

When handling them see that your fingers are perfectly clean as all finger marks will show up after gilding. Now wire them up and having the solution hot and the anode and cathode rods connected with the dyanmo, the current being two to two and a half volts, suspend them in the solution, the surface of the dozen links being about twelve inches the anode should have a surface of about three by four inches. Allow to plate for about three minutes, remove, rinse, scratch-brush and hang in the solution for two minutes more, remove, again scratch-brush and rinse and dry in hot sawdust. By this process there will be deposited on the links about three or four grains of fine gold, which will be a very good color, wearing well

*Electroplaters' Quarterly, Oct. 1910.

and will not tarnish, even on a very low karat. For cheaper grades the work can remain in the solution from one to two minutes and receive a fairly good color. After using the solution for some time it will become dirty and should then be filtered, in fact it should be filtered at least once a week, as a solution containing dirt will never color well.

In coloring silver or low karat work the solution will in time take up some of the silver, making the color too light, which can be partly removed by suspending in the solution a bright copper plate, upon which the silver will be deposited. When covered with silver remove, emery paper and replace again until no more silver is thrown down upon it; use no current. Should the anode turn dark or black, there is not enough cyanide in the solution, then add, but never more than one half to one ounce to the gallon. When the work is removed from the solution it should be a dull yellow color, if it comes out brown your current is too strong or the solution weak in gold, and will always have a reddish tinge after scratch-brushing. The anode should always have a bright, crystalline appearance and there is one thing always to be remembered, that the proverb "Cleanliness is next to Godliness" is ever true in gilding and in fact in all electroplating processes, for dirt is one of the worst foes you will have to contend with, so try and keep out all substances and chemicals excepting cyanide and gold and use only distilled water.

THE ROSE GOLD FINISH.

By J. S. Stremel.

The unfailing popularity of this beautiful finish might be attributed chiefly to three of its many excellent properties, namely, its rich soft and pleasing tone, the advantageous manner in which the detail of a relief design (whether deep or shallow) may be made to stand out conspicuously, and lastly, the comparatively small cost at which it may be produced, in spite of the fact, that, it positively requires a deposit of the precious yellow metal to do so.

Inasmuch as the production of this finish comes under the heading of "Coloring," it is customary to use a dynamo especially adapted to this class of work; the type generating a current of from 6 to 10 volts pressure with a comparatively small ampere capacity. The Bunsen type of battery may be employed, but its use is limited, and, considering time and trouble required in the maintenance of the working capacity, it is obvious that for all around working efficiency the dynamo proves to be the most practical source of electrical energy. Another important factor is to have a fairly good supply of clean water for rinsing purposes and "Cleanliness" should be the by-word at all times, never allowing dust, dirt, contaminated rinsing or brush water to enter the solution.

I have been called upon to produce the rose gold finish upon several classes of work and different kinds of metals such as solid gold jewelry, silver and semi-valuable jewelry, cheap novelty work of brass, copper and soft metal, black metal and brass portables, bronze tablets, iron fire-places, large figures of spelter, and full size dinner sets, and find that a simple bath of potassium cyanide, water, caustic potash and gold is in many instances very effective. From my experience with these various kinds of work I have concluded that so far as the solution is concerned simplicity is superiority and that in work of solid gold where the smut is obtained exclusively with the gold the richness of tone depends almost entirely upon the bath together with proper manipulation of same while, with the cheaper grade of goods, the color and finish are greatly dependent upon the character and color of the smut produced before entering the gold solution.

I shall not dwell upon any particular class of work but sum up briefly on the different kinds I have had to deal with in the course of my experience. As to jewelry it is hardly necessary to state that after the preliminary filing, immersing, stripping, polishing, etc., which doesn't interest the colorer to any marked degree, unless the work be badly marred or chafed, the goods are sand-blasted all over (or in part to meet the fancy of the owner) the variety known as sea-sand being employed. This is the fine sand more commonly known in this section as Coney Island sand and when properly done the article should have an even dull, velvety appearance. After the usual cleaning with potash, cyanide and scratch-brush it might again be passed through the dips and rinsed before immersing in the bath. With a steady, moderately strong current, and by employing a slow upward and downward motion with the work, at the same time moving the anode all around it, a rich, soft, light but not pale smut is obtained. This seems to me to be a more logical manipulation than a constant making and breaking of the circuit by "boiling" on one side and then withdrawing the anode and placing it on the other side of the work, which method tends to produce a foxy color at the points of least resistance. The bath which I have used to advantage is composed of

Water	1 gallon
C. P. Cyanide of potassium	4½ ounces
Gold equivalent	6½ dwts.
Caustic potash	2 sticks

This solution worked at about 145°-150° Fahr. gives good results.

The gold is first reduced to fulminate and a stock solution made which should contain but little free cyanide.

The addition of the caustic potash aids the development of the smut and keeps the solution clear although dirt may get into it but this of course is no special advantage for dust and dirt will do its work no matter what else goes in.

After being "Colored" the work is relieved with the thumb and fingers using bicarbonate of soda in the operation as this will in no way mar the high lights and also gives the softest finish. While the relief must be bright, it is not exactly a roman finish but something less lucent and where there is a decidedly plain surface such as the center of a scalloped locket the very center should be lightly scratch-brushed causing a fadeaway effect after which the reverse or absolutely plain parts are brushed to a lustrous roman. This done the articles should receive a momentary flash in a final yellow solution containing 2 ounces of cyanide of potassium and an equivalent of gold of 4½ dwts. to the gallon. No other additions are necessary except possibly a little phosphate of soda. Work of this nature should be dried in clean boxwood sawdust.

This method gives but one of the shades of rose gold. Various other shades both lighter and darker may be obtained by the mere changing of the method of manipulating the anode and work, also by decreasing or increasing the current or increasing the cyanide and gold content of the bath.

Distinct shades such as very pale, medium, dark, old rose and antique finishes of rose may be obtained by

such additions as silver, copper, carbonate of potassium, arsenic, etc., and after relieving the highlights are "brought up" to the desired color in the final yellow solution it being understood that the smut naturally will also become lighter, for which, of course, allowance must be made by obtaining a darker tone in the smut than is actually required in the finished state.

In producing the light and orange rose such additions to the bath as carbonate of potassium, or lodium, ferro cyanide of potassium or carbonate of copper are not essential. The carbonate of potassium smut having a tendency to fade out while a slight excess of both the potassium and sodium will materially darken the highlights, carbonate of copper should never be added as the color produced is far from a rose and if used in a hot solution with a strong current the deposit is too hard, thus interfering with the luster of the relief parts. I refer of course to work receiving a heavy deposit in the gold bath.

Now as regards cheaper grade goods the best color of smut is obtained in the cyanide of copper bath. This gives a deep red smut which readily responds to the gold bath almost immediately giving a rich orange rose. This bath should contain only cyanide of potassium and carbonate of copper in excess, should be worked at about 100° Fahr. with a weak current. This gives good results on small articles such as silver trinkets, pipe trimmings, scarf links, and other semi-valuable jewelry. The one disadvantage is the difficulty in maintaining uniformity of color and for this reason the acid-copper bath is ofttimes resorted to for a smut, as is the silver solution and the more modern smut-dip, but each of these methods when using the same bath and same amount of gold give different results. It therefore becomes necessary to use differently composed solutions in handling the cheap work. It is absolutely necessary to have solutions rich in gold for then the color is obtained more readily and less gold is used than if the metal content were low. For a regular rich rose on a smut obtained in the cyanide of copper bath a solution should be composed of

Water	1 gallon
Potassium cyanide	3½ ounces
Caustic potash	1 stick
Gold	4½ dwts

Used at a temperature of 135° Fahr.

Articles of brass should be pickled, fired off, matt-dipped, run through the regular bright dip, then smut dipped, flashed in a good copper solution and then colored using a little of the carbonate of potassium in the aforementioned bath and a stronger current than with smut from the copper solution. Articles of copper may also be done in this manner after obtaining a satin finish. Soft metal articles should be run through the electric cleaner, sweet and sour-coppered and colored in a bath containing less free cyanide and using a weaker current and omitting the caustic potash.

All work sour-coppered may be whitened in the silver to aid the operator in getting a rich rose. Large articles of brass, bronze, iron, etc., may be done in the cyanide of copper bath using a weaker current on the iron.

Best results sare obtained on spelter figures by first silvering after which they are brushed and finished in the sweet-copper. A solution with less free cyanide and rich in gold gives the best results on this kind of work. All articles however prepared or colored should be flashed in the final yellow composed of:

Water	1 gallon
Potassium cyanide	2 ounces
Gold perchloride	4½ dwts

or a regular bright gilding solution.

In the event of very cheap work the relieving may be done before the gilding and the articles just flashed in a good rich solution. A very light flash in the brass or bronze bath will materially aid in the saving of the gold solution, and the colors are obtained by developing the smut exclusively in the gold or upon the smut of the cyanide copper. In conclusion I would say that it is the best gold bath.

THE GREEN GOLD FINISHES.

By Aug. G. Hoffmann.

To produce a good green gold finish upon articles at a fair cost, that neither blends to the shades of yellow or gray, but is purely green in shade and tone and cannot be termed as a yellowish or silver green is one of the many irritable features of the electroplating art. This is especially so when a dark or antique green gold is called for.

Many platers are turning out and placing upon the market today various articles finished in antique green gold, and when one takes the opportunity to compare them he will find many different shades.

Some will be very brown in the background and blend to a yellowish green on the high lights, others show a silvery tint and rather dark background. Then again we find some that have a grayish tone tinted green and yet could hardly be termed so.

I was called upon sometime ago to produce a dark green that was green all over, both in background, as well as on the high lights, and after considerable experiments with different chemical agents, such as lead, sodas, antimony, cadmium, and nitrates, I found that the best results could be obtained from a solution containing arsenic.

I may state that it requires considerable care in the manipulatory processes connected with the production of the finish obtained from the following formula:

Water	1 quart
Potassium cyanide	3 ounces
Potassium ferrocyanide	1 ounce
Caustic potash	1 stick
Ammonium chloride	1 ounce
Gold as perchloride	2 dwts.

Dissolve nitrate of silver in water (crystals are best) and after having the above solution in working condition suspend a platinum anode on the negative and one on the positive pole and set in action. While working add a little of the nitrate of silver solution at a time until deposit shows green. Then add a drop at a time of a solution of arsenic that has been thor- the green deposit shades over to a deep green smut. oughly cut and boiled with potassium cyanide until When the high lights are relieved with bicarbonate of soda on articles plated in this solution, which is used cold, they show out in a deep, rich green color.

It can be readily seen by the complication of metals and chemicals used, that this solution requires the utmost care in handling, making and keeping and working, but like everything else it is no trouble when you get used to it and can be placed in the same class as a brass solution so far as the plater is concerned. I may state that I would gladly produce a sample for anyone interested.

METALLOGRAPHY AS AN AID TO THE BRASS FOUNDER*

By H. S. Primrose.†

Practical metallography, although not yet raised to the status of an exact art, is gradually coming to be regarded as a valuable aid to the chemist in a well-equipped works making non-ferrous alloys. The microscopical investigation of the structure of alloys is largely superseding the method of judging quality by fracture, and is undoubtedly a more certain guide to the foundryman who wishes to escape the repetition of serious failures due to causes other than change of chemical composition.

The text-books dealing with the subject mostly take up the theoretical side of the constitution of the alloys, many of which have little or no practical or industrial value; and those which do not fall into this category are usually only given as examples of good or selected specimens. Thus metallography, as applied to the needs of the brass or bronze founder, still lacks the needed degree of standardization, and the object of this paper is to discuss some outstanding cases met with in a large workshop practice, in which the pathological examination of a few failures and defective gun-metal castings has been not only instructive, but of considerable utility in discovering what faults to avoid, more particularly when chemical analysis afforded no clue.

The usual standard to which most foundries have to work is governed by rigid specification of the tensile strength and elongation of test-bars from the castings produced, and while this method affords a valuable check upon the acceptance of faulty workmanship, failure generally results in throwing the onus on to the metal, but most cases of microscopic examination reveal the fact that structural deficiencies are to blame. The ultimate strength and degree of elongation which a metal possesses depends entirely on the nature of the crystalline arrangement, and this, in turn, depends on the rate of solidification, as also to a less extent on the rate of cooling after solidification. For each metal or alloy there is a certain size and arrangement of crystal grain which gives maximum strength and durability. If this be exceeded, then there is not sufficient interlocking of the crystals, and thus large cleavage planes are formed, but if the crystal grain be too small, the interlocking may be so minute as to be almost valueless.

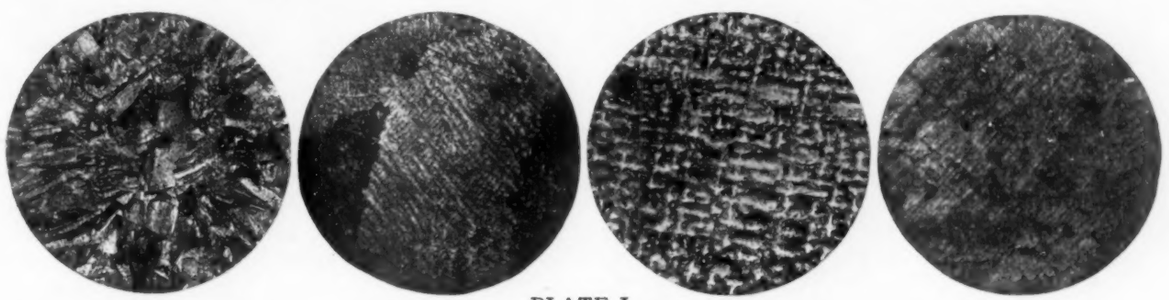


PLATE I.

Fig. 1.—Gun-metal Fracture. Natural Size. Oblique Illumination.

Fig. 2.—Gun-metal Test Bar. Magnified 20 diameters.

Fig. 3.—Gun-metal Test Bar. Magnified 60 diameters.

Fig. 4.—Gun-metal Test Bar. Magnified 150 diameters.

PREPARATION OF THE SPECIMEN.

As the appearance of a fracture depends largely on the way it is made, its practical value is very limited. If the structure is macroscopic and visible to the naked eye, it usually indicates a too coarsely crystalline structure, or that the specimen has been broken hot, as is shown in Fig. 1, Plate I., which represents the holocrystalline structure of a gate of a gun-metal casting reproduced natural size. When the structure is of fine grain a hand-magnifier may be used, but this reveals nothing of the real or internal structure, for investigating which a microscope must be employed. To avoid the difficulty of focussing even the smoothest parts of the fracture, it is necessary to prepare a plane surface of the metal, and this is done by polishing. Care must, of course, be taken to ensure that the polished surface is kept perfectly level, and "hog-backing" especially should be avoided. File-marks and scratches are removed by application of successively finer emery-papers, but most copper alloys are so excessively soft that even the finest "000" French emery-paper and the most delicate touch will leave markings which will obscure the structure. The excessive precautions recommended for the final polishing of specimens intended for research work are not always necessary for workshop practice, or as a foundry check. A quite satisfactory final polish can be imparted by the use of a "Selvyt" cloth, stretched upon a polishing disc, moistened with water carrying a small amount of diamantine polishing powder in suspension. The development of the structure is variously accomplished, but the structure is most usually revealed by etching with alcoholic solution of ferric chloride, copper ammonium chloride, &c., and recently heat or oxidation tinting has been coming into vogue. This treatment attacks the various constituents at different rates, and the process must be stopped immediately the mirror brightness of the surface has been destroyed. This often distinctly shows the orientation of the crystals to the naked eye, but when this is not the case a low magnification of 20 or 30 diameters, using oblique illumination, will almost surely do so. Sometimes this orientation is also visible by vertical illumination, and is shown in Fig. 2, Plate I. The most definite results are, however, obtained by vertical illumination, which is got by a small reflector placed in the tube of the microscope, which, for ordinary work, may be of quite cheap construction, as the magnifications usually employed are low. If photographic records are desired to be kept, or when special investigation is required, it is usually advisable to employ a more scientific instrument, such as the Rosenhain metallurgical microscope, made by Messrs. Beck of

* Paper read at Glasgow meeting Institute of Metals, September 21-23, 1910.

† Metallurgist to Messrs. G. & J. Weir, Ltd., Cathcart.

London. The difficulty of photographing is not great, as all the necessary lenses are present in the microscope combination, camera bellows only being required. In this case it is found best to examine the projection of the specimen on the screen rather than the optical image, and while the etching colorations give a better idea than a photograph, the latter is permanent, and can be subsequently referred to.

The photomicrographs of gun-metal specimens reproduced in this article (which photomicrographs are reduced 25 per cent. in reproduction) are all taken from test-bars which were attached to actual castings, and subjected to tension to determine tensile strength and elongation. The composition of the specimens is that of the usual Admiralty gun-metal, viz.—88 per cent. copper, 10 per cent. tin, and 2 per cent. zinc. The castings were made in dry-sand moulds, and as nearly as possible all under the same conditions of cooling.

INFLUENCE OF POURING TEMPERATURE ON CRYSTALLIZATION.

With gun-metal castings the temperature of pouring has a great influence on the strength of the finished castings. The chief cause for the differences which exist in the quality of the metal is the different rates of cooling and freezing. In the case of the pouring being at a high temperature, just before freezing commences, the sand of the mould becomes highly heated, and so the freezing of the metal is slower than when the metal is not so hot at first, and hence the crystals have time to grow and form a good strong interlocking structure. This is well shown in Fig. 3, Plate I., which is the photomicrograph of a test-bar from a casting poured at 1100° C. and slowly cooled. A similar bar cast at a much lower temperature (950° C.) was cooled much more quickly, and in this instance not only have the crystals been prevented from growing, but the constitutents of the metal have remained practically in a state of solid solution with no well-defined structure, which is seen to be unresolved by the higher magnification of 150 diameters in Fig. 4, Plate I. The differences in the tensile strength and elongation of the two pieces is also very well marked, showing the difference in strength of the two pieces of metal.

As the two casts are of practically the same composition, it follows that the variation in the temperature of casting, and hence the consequent rate of cooling, must have a very distinct effect in the structure or crystalline formation of the metal. In castings that have to stand the test of a high-water pressure the interlaced type of structure is important, so that the temperature of pouring such castings has to be carefully watched. If it is too low when run, the resulting casting will be porous and weak, and will not stand even a moderate pressure of, say 80 to 100 pounds per square inch, instead of the necessary pressure of 700 pounds and upwards. The reason for this is obvious from a consideration of the micro-structure, as the interstices of the light-colored copper-rich ground mass (Fig. 3) have been filled in with small land-locked seas of eutectic, and thus soundness results, but with the quick uniform contraction of the solid solution, intercrystalline pores have been developed, and show as microscopic holes throughout the poor metal (Fig. 4). Following on this, it would appear that to get the same quality in all castings, the metal for large and thick castings should not be so highly heated when cast as that which is used for much thinner work. Thus the casting temperature of gun-metal is not a constant, but must necessarily vary with the weight of the casting, as well as its internal and external form, and the number of branches, arms, and projecting parts on the casting. Now if the founder is careful, and bears this fact in mind, many difficulties can be overcome by arranging his moulds of dissimilar castings so that those of a light nature are cast first with hot metal. It is evident that by using a ladle a great variety of casting temperatures can be got, and occasional pauses may be made between some of the moulds if the temperature is too high for the nature of the work.

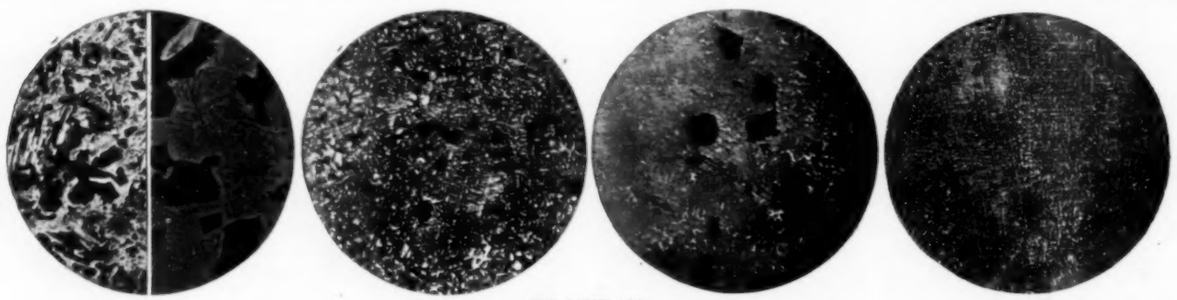


PLATE II.

FIG. 5.—Gun-metal in Vent. Magnified 240 diam.

FIG. 6.—Gunmetal Test Bar. Magnified 90 diam.

FIG. 7.—Gun-metal Test Bar. Magnified 30 diameters.

FIG. 8.—Gun-metal Test Bar. Magnified 30 diameters.

Excessively rapid cooling has the effect of rendering gun-metal very brittle, and almost steel-like in appearance and hardness. A sample quenched from just below solidification-point evinced a very marked change in structure, as shown in Fig. 5, Plate II., and this required a high magnification (240 diameters) to show the copper separated in almost pure crystallites, surrounded by a ground mass of eutectic which is of the hard brittle nature.

CHARACTER OF BLOW-HOLES SHOWN BY THE MICROSCOPE.

The existence of blow-holes in gun-metal weakens the castings to a very considerable extent. The presence of the blow-holes may be due either to slight dampness in the mould when the metal is cast into it, or the gases which form these holes may be actually dissolved in the metal when it is cast. They are often a great source of trouble to the founder, casting after casting having to be scraped on account of such holes, which usually do not show until the casting comes to be machined. They are often quite small, and, as shown in Fig. 6, Plate II., they are unequally scattered through the field, and it can easily be understood how the tensile strength of the metal is reduced on account of these holes, even although the composition is perfectly correct and the metal has been properly melted. A microscopical examination is the surest way of ascertaining the cause of blow-holes. If these are clean and confined to the outer portion of the

castings, they are certain to be due to the steam formed within the mould, in which case a simple remelting brings the metal right. Fig. 7, Plate II., shows some blow-holes near the side of a casting due to steam, and also how the internal structure has been altered by the too rapid cooling. Fig. 8, Plate II., shows the improved structure of the metal after remelting.

More often the pin-holes in castings appear dirty under the microscope, and on polishing, some brittle material is rubbed out, causing serious scratching of the surface. This is due to segregations of included oxides either of tin or copper, which the small percentage of zinc has not been able to remove. Under this condition remelting is of no avail unless with the aid of some deoxidizing agent such as phosphor tin or phosphor copper. This need only be added in very small proportions, and which of these is employed will depend on whether the copper or tin is deficient. Their action is due to the phosphide attacking the dissolved oxides, reducing them to metal, and the phosphorus escapes as pentoxide. Figs. 9 and 10, Plate III., show interesting photomicrographs of 10 per cent. phosphor tin and phosphor copper, illustrating the structures of the two phosphides and the accompanying eutectic alloy.

The test-bar of which the photomicrograph is given in Fig. 11, Plate III., only withstood an ultimate stress of 8.6 tons per square inch, and on microscopical examination evinced several patches of very indefinite structure fitted with cavities in which oxide inclusions remained. This metal, on remelting with about 0.5 per cent. of the phosphor copper, gave a casting which stood over 16 tons per square inch, and showed 24 per cent. elongation on a 2-inch test-bar. This small quantity of phophorus was evidently not only sufficient to remove the intermixed oxides, but also to leave a trace of phosphorus in the metal. This is indicated by the good structure shown in Fig. 12, Plate III., the higher magnification of which shows the increased proportion of separated eutectic due to the small amount of phosphorus present.

It is not often that gun-metal is cast from large furnaces or ladles, but when this is done in large workshop practice special precautions must be taken to ensure the uniformity of the metal from beginning to end of the cast. Segregation does not so readily take place, but with a great weight of metal in the ladle some scum and dirt are apt to be intermixed; the removal of this is somewhat troublesome, even with stirring and deoxidizing.

The heat-treatment of gun-metal is a subject which as yet has not been fully investigated, but the results got by M. Guillet and others on the heat-treatment of the copper-tin alloys show that with the useful bronzes profound changes are effected by varying temperatures of annealing and quenching. Now if gun-metal were subjected to a similar treatment it is more than possible that equally remarkable changes would be got, and it is proposed to make this the subject of a future paper.

The constitution of the binary alloys of copper with tin and also with zinc has been very thoroughly worked out, but there is still scope for useful research on the ternary alloys, especially in the region rich in copper. When one considers the large number of commercial alloys of this composition, it is surprising that no systematic investigation has been made in regard to the strength and durability of what Professor Thurston calls the "kalchoids."

PLATE III.

FIG. 9.—10 per cent. Phosphor Tin. Magnified 60 diameters.

FIG. 10.—10 per cent. Phosphor Copper. Magnified 90 diameters.

FIG. 11.—Gun-metal Test Bar. Magnified 60 diameters.

FIG. 12.—Gun-metal Test Bar. Magnified 240 diam. Magnified 60 diam.

PLATE IV.

FIG. 13.—Bronze Casting. Magnified 30 diameters.

FIG. 14.—Gun-metal Test Bar. Magnified 30 diameters.

FIG. 15.—Gun-metal Test Bar. Magnified 30 diameters.

FIG. 16.—Gun-metal Test Bar. Magnified 20 diameters.

The addition of zinc to ordinary bronze not only improves the color, but makes the alloy cast much better. Without materially altering the structure, the zinc prevents the formation of a certain small amount of eutectic, and also acts as a deoxidizing agent for any trace of copper or tin oxide dissolved in the metal. This is clearly demonstrated by comparing Figs. 13 and 14, Plate IV., which proves how cavities can occur in the segregated eutectic from a bronze containing 88 per cent. copper and 12 per cent. tin (Fig. 13), whereas in the gun-metal with 2 per cent. of zinc alloyed to the 88 per cent. of copper and 10 per cent. of tin these are entirely absent (Fig. 14).

Whilst the pyrometer is of great service in determining the temperature of the metal before pouring, it is not

practicable to take the rate of cooling of each casting. Hence it often occurs that perfectly sound metal gives test-bars which fall just short of the required strength, and the reason for this is another point easily explained by the microscope. Fig. 15, Plate IV., shows quite a remarkable instance of the copper crystals having grown too rapidly in certain directions, and thus the required amount of intertwining has not been effected, with the result that the tensile strength is somewhat low. Fig. 16, Plate IV., shows a pronounced case of rather fine-grained structure almost devoid of interlocking, which possessed low tensile strength and elongation, also due to incorrect cooling of the metal. It is likely that a suitable annealing would have promoted diffusion and brought the strength of these two castings up to a very much higher standard.

In the examination of gun-metal test-pieces under the microscope, the comparison of the various structures shows very clearly the difference between the good and bad pieces. Whenever the structure is of a good interlocking crystalline type, as shown in Figs. 3, 8, and 12, the strength of the metal is always good, possessing a tensile strength of 15 tons per square inch and upwards, with an elongation of 20 to 25 per cent. on 2 inches. On the other hand, whenever the structure appears as in Figs. 4, 6, 7, and 11, it is easily understood how the tensile strength comes to be low. In these latter cases the metal is weakened either by the presence of gas in the form of blow-holes, or else the casting is devoid of the good crystalline arrangement which gives the metal its strength.

This comparison very quickly enables the necessary experience to be acquired for determining the cause of the troublesome defects should such occur, and this is more than half the battle in the direction of putting things right again. Whilst there is still some controversy in regard to the interpretation of the results of the metallographic examination of certain of the bronze alloys, there need be little fear of dubiety in investigating any of the useful alloys from the pathological standpoint. Care, of course, should always be taken to ensure the proper sampling of the test-piece, avoiding any portion which has been subjected to undue stresses; but, on the other hand, the structure right at any point of failure may be examined with benefit, since it is through profiting by faults that ultimate success is achieved.

The author has to express his grateful acknowledgment to Messrs. G. & J. Weir, Limited, Cathcart, for their kind permission to publish these notes and the photomicrographs prepared in the course of their laboratory testing.

The following table gives full particulars of the composition and physical properties of the specimens illustrated by the photomicrographs:

Fig. No.	Material.	Analysis. Copper, P. C.	Tin, P. C.	Zinc, P. C.	Phosphorus, P. C.	Tensile Strength. Tons per Sq. In.	Elongation P. C. on 2 Inches.	Remarks.	Microstructure.
1	Gun-metal, gate	88.0	10.0	2.0	...	...	...	Broken hot	Highly crystalline fracture.
2	Gun-metal, bar	88.0	10.0	2.0	...	18.6	24.0	Very good metal	Well-defined orientation.
3	" "	88.0	10.0	2.0	...	16.4	24.0	Good standard metal	Good crystalline structure.
4	" "	87.4	9.7	2.7	...	11.0	4.5	Poor metal	Very bad structure.
5	" (chilled)	88.0	10.0	2.0	...	...	...	Sample from vent	Brittle eutectic structure.
6	" bar	88.0	10.0	2.0	...	9.8	3.0	Very weak metal	Badly fitted structure.
7	" "	87.6	9.7	2.6	...	5.0	...	Very faulty metal	Defective structure and blow-holes.
8	" "	87.8	9.8	2.3	...	16.0	...	Good metal, No. 7 remelted	Strong interlocking structure.
9	Phosphor tin	...	...	..	10.25	...	...	.....	Tin, with phosphide of tin crystals and eutectic.
10	Phosphor copper	...	...	..	9.78	...	...	.....	Phosphide of copper crystals in copper phosphide eutectic.
11	Gun-metal, bar	88.0	10.0	2.0	...	8.6	7.5	Burnt metal	Poor metal, with oxide inclusions.
12	" "	88.0	10.0	2.0	trace	16.1	24.0	Very strong metal. No. 11 remelted	Excellent structure.
13	Bronze (cast)	88.0	12.0	..	...	12.0	5.0	Hard coinage metal	Good structure, but pitted.
14	Gun-metal, bar	87.8	9.8	2.3	...	16.0	19.0	Good casting metal	Very good structure.
15	" "	88.0	9.8	2.1	...	13.4	12.5	Medium good metal	Insufficient interlocking.
16	" "	88.0	10.0	2.0	...	9.5	5.0	Poor metal	Fine grain; almost no interlocking.

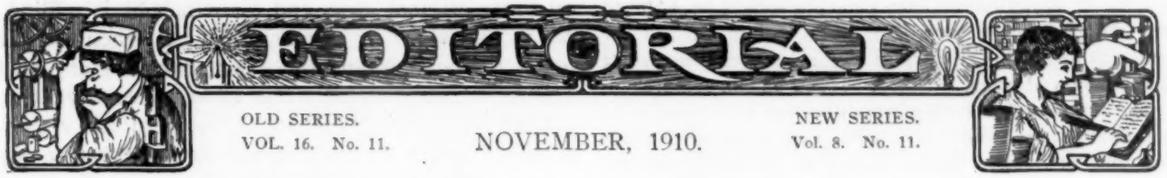
THE REMOVAL OF THE FIRE COAT OR GREEN FROM KARAT ALLOYS BY THE REVERSED CURRENT.

By Charles H. Proctor.

The removal of the fire coat or green, as it is commonly termed, by the usual acid pickles, consisting of aqua regia, hydrochloric or chromic acids, is oftentimes very unsatisfactory on account of the roughened or sanded appearance after pickling, especially in filligree or raised settings on rings, bracelets or other trinkets. It is therefore desirable to use a solution that will leave the articles as bright and clear as possible. The following method, that was given some months ago in the Shop Problem columns of The Metal Industry by the writer, has proved very satisfactory. Some prominent manufacturers in New York City claim it is the best method they have ever used. To produce the results mentioned first prepare a solution consisting of the following:

Carbonate of Copper.....	2 ozes. by weight.
Ammonia, 26 per cent.....	4 ozs., by measure.
Carbonate of Soda.....	4 ozs.
Cyanide of Potassium.....	8 ozs.
Water	1 gal.

Use the solution cold or slightly warm. The bath is used with a reversed current, so that the polarity is just the opposite to plating. The cathode should be a sheet of soft copper and should entirely surround the jar, if one is used, and be connected with the negative pole. The center pole should be the positive. Placing the articles on small frames or sufficiently heavy copper wire connected to the positive pole and moving to and fro rapidly, with a strong current, will leave the articles bright instead of dull as a result of acid pickles.



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ADVERTISING RATES ON APPLICATION

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FOREIGN INTEREST IN AMERICAN INDUSTRIES FOSTERED BY CONSERVATISM.

A New England newspaper has a good deal to say regarding attempts by foreign engineers and manufacturers to get hold of American ideas relating to methods and machinery pertaining to the brass manufacturing industry. The paper in question makes quite an arraignment of a prominent engineer in Germany who has been quite industrious in gathering information relating to the industry. It even goes so far as to call him a pirate, and to charge him with trying to steal and offering to pay men to spy upon manufacturers and report to him the results of their researches.

The communication which so arouses the ire of the publication is as follows:

LUDENSCHEID, GERMANY.

Mr. ——— ————,
No. —— Street,
Waterbury, Conn., U. S. A.
(Confidential.)

Dear Sir:—

I saw your advertisement in the ———— and beg to advise you that I am in the market for a number of working drawings, etc., in regard to special machines of various kinds, same as used in the wire, rod, tube and sheet metal mills of your city and vicinity.

There will be no doubt a number of mechanical engineers making a specialty of designing such machines as above referred to. Kindly let me know their addresses so that I may be able to communicate with them intelligently. I respectfully, however, request that you do not refer this inquiry of mine or my name direct to the engineers themselves, owing to the fact that I am in communication with some people.

Kindly write me about your specialties with an addition of particulars and a list of your references. A reply would be appreciated.

Thanking you in advance and placing my services at any time at your disposal, I remain, dear sir,

Very respectfully yours,

——— ————.

Our contemporary comments upon the above letter in part as follows:

Unless Waterbury manufacturers protected their interests from the wholesale invasion of outside interests bent only upon stealing ideas or getting them at the lowest possible outlay of expense, they would soon find themselves brought face to face with a condition bordering upon the keenest competition imaginable in foreign countries especially.

Waterbury turns out annually some of the most modern and valuable machinery for the drawing of wire, rods and tubes in the world, and some of the appliances of this character have been installed in large mills across the water, especially in England and Russia. Sheet metal machinery is

also made in Waterbury. That attempts should be made to purloin the products of American brains and to defraud the inventive genius of the country of its just proceeds emanating from the labors of years, is almost beyond human comprehension, but the fact that such pirates do exist is demonstrated by the above letter, which speaks for itself. It constitutes a strong and impressive object lesson to Waterbury manufacturers.

While THE METAL INDUSTRY is not at all in sympathy with any one who would attempt to steal or otherwise purloin the product of other people's industry and brains, yet we must confess we fail to see where this German is doing anything outside the limits of the law when he states that "he is in the market," etc. If he expects to get one thousand dollars' worth of information for ten, it is nobody's concern if he succeeds in doing so; that is the lookout of the party having the information to sell.

A goodly portion of the special form of machinery used in the brass business is patented and thus is fully protected, and anyone is able to get full specifications by simply sending five cents to the Patent Office, Washington, D. C. As a matter of fact any one who is interested in this class of machinery has only to correspond with the numerous firms who make a specialty of manufacturing, either the patented machinery under a royalty, or who are perfectly willing to devise and design new forms, and all that is necessary is to have the requisite amount of money required for such services. Drawings, plans and specifications are furnished by these firms and are at all times accessible to any one, either at present engaged in the manufacturing of brass, or who is contemplating entering such enterprise. A concern that has novel machinery methods, or devices not protected by patents, must take its own risk against their being stolen and used to advantage by competitors. While we do not for a moment countenance this sort of thing as good business, there is no concealing the fact that it is prevalent all over the world and will be so long as that peculiar thing known as human nature exists.

We do not think it entirely fair to the German to condemn him on the strength of such a letter as the above. If he made a direct statement in as bald a manner as the article in question insinuates, perhaps there would be some ground for the attack. And if this were so would he not perhaps be justified in trying to get back maybe what did once belong to his and other countries across the sea? If not in the newest form of advancement, then the fundamental ideas brought over here.

Did not the entire brass industry come from Great Britain, did we not import men to teach and show, did we not send men over to work as laborers, men who were natural mechanics masquerading in the costume of ignorance? Was it not on the fundamental ideas obtained from the mother country that our whole magnificent brass business in the Naugatuck Valley was founded? Why should we blame the foreigner then because he is anxious to know what we have built up on those original ideas and for which he is willing to pay? Did we offer to pay? No, not when we could get it for nothing, and this same thing is going on today. We have in mind a case where, several years ago it is true, a prominent Waterbury concern sent a man to another State to seek employment in order that he might obtain working information regarding a particular machine. That he failed to carry out his purpose was not due to lack of energy on his part, but to the vigilance of the victim company.

To our mind the principal cause of such a state of affairs is the radical conservatism existing in the brass business. When a certain process or machine is shrouded in mystery and closely guarded, curiosity and interest are aroused to the highest pitch and every effort is made to find out the smallest detail. Very often what is supposed to be some wonderful secret is discovered to be the application of well-known principles and is no secret at all. What one concern has tried out and not found successful may be the very thing that another is spending large sums of money to keep inviolate. Again, men will travel, and as long as men will talk there is no known way to keep ideas gathered in one place from being planted and developed in another. In wide contrast to the conditions mentioned as existing in the brass industry is the attitude of the people engaged in the steel business. Here we find plants thrown open, not only to the public, but also to competitors, and criticism is invited of both machinery and methods.

NEW BOOKS

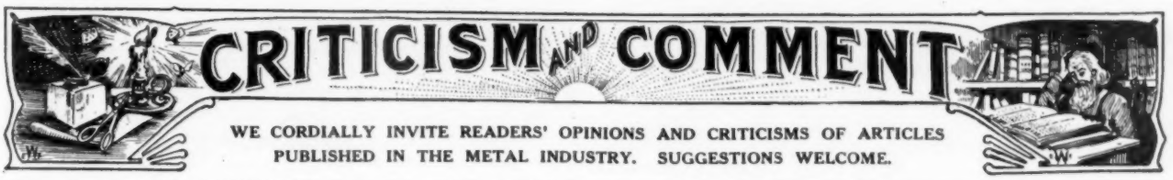
"ELECTRO-METALLURGY—A PRACTICAL TREATISE." Third Edition, revised and enlarged. By Walter G. McMillan, F. I. C., M. Inst. M. M., late lecturer on metallurgy in Mason University College, Birmingham, and formerly chemist and metallurgist to the Cossipore Ordnance Factories. Revised by W. R. Cooper, M. A., B. Sc., A. I. C., member of the Institution of Electrical Engineers, associate member of the Institution of Civil Engineers, Size, 8½ by 6 inches; 425 pages; 113 illustrations; bound in red cloth. Price, $4. Lippincott & Company, Philadelphia, Pa.

This book, which is the third edition of the work on Electro-Metallurgy, which was published in 1890, has been completely revised, enlarged and brought up to date. The book in itself is a combination of electro-metallurgy and electro-chemistry, and also gives a wonderful amount of information regarding the elements which are so electrically treated. The work consists of twenty chapters, with addenda containing useful tables relating to metallurgical and chemical questions. The subject of electro-chemistry as applied to electroplating is carefully and thoroughly described in fourteen chapters, which cover sixty-six pages of the book. The information contained in these chapters is most valuable and is treated in such a way as to be most readily understood by even the mind untrained in chemical and electrical subjects. Chapters four, five and six are particularly prolific in the variety and completeness of the information given and really constitute a text-book in themselves. The subjects of electro deposition of the various metals, such as gold, silver, copper, nickel, cobalt, iron, platinum, zinc, chromium, and, in fact, all the metals that are capable of deposition by electricity, are thoroughly and carefully treated in separate chapters, and the information given therein constitutes a reliable guide for even the merest tyro in the business. Chapter fifteen is devoted

to electro-metallurgical extraction and refining processes, and all of the well-known and newest processes that have been devised for the electric extraction and refining of metals from their ores are thoroughly covered. Chapter sixteen is devoted to the recovery of certain metals from the solution of waste substances and should be specially valuable to the electroplater. A classic dissertation on the modern theory of electrolysis is given in chapter nineteen and constitutes a most important addition to the wealth of knowledge contained between the covers of this book. A glossary of substances commonly employed in electro-metallurgy takes up twenty-six pages in chapter twenty.

Taking it all in all, this work is a combination of the information that might be gleaned through a perusal of Langbein and Watt and Phillips' works on electroplating, Brant and Hiorns on alloys and mixed metals—in fact, the book is a most valuable encyclopedia as well as a guiding text-book for electroplater, metallurgist and chemist, and should by all means be included in the library of anyone either remotely or actively engaged in these industries.

For sale by THE METAL INDUSTRY.


CRITICISM AND COMMENT
WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY. SUGGESTIONS WELCOME.

USE OF ALUMINUM FOR NON-CORROSIVE PURPOSES.

To the Editor of THE METAL INDUSTRY:

In response to the inquiry of your correspondent who states that Aluminum tubes after a use of fourteen days for sugar refinery work became so badly corroded that they had to be replaced. I would say it is assumed that the tubes were used in a multiple effect evaporator, and the reason they corroded is undoubtedly due to the practice of cleaning off the scale which forms on evaporator tubes, through the method of boiling out with either hot caustic potash or a solution of hot muriatic acid, these materials being the most efficient known for removing the kind of scale which forms on sugar evaporator tubes.

Caustic potash attacks aluminum rapidly; muriatic acid is a natural dissolvent for aluminum; and we have never recommended pure aluminum tubes for use in sugar evaporators, unless the operation of cleaning the scale from the tubes was performed by some mechanical method, or a chemical which did not naturally attack the metal.

The proper tube to use for sugar evaporator work is a bi-metallic tube, copper outside, aluminum inside. This tube has a higher efficiency than brass, the material commonly used. The bi-metallic tube is also superior to a straight copper tube, for the reason that the scale, forming on the copper exterior, can be readily removed with either caustic potash or muriatic acid, the aluminum lining protecting the copper from the corrosive effect of ammonia which entrains in the steam in the second and successive effects of multiple sugar evaporators. The amount of ammonia carried from the first or second effect, as the case may be, has a decidedly corrosive action on brass or copper tubes. As the aluminum-lined or bi-metallic tube would withstand the corrosive action of ammonia, such a tube should be superior to either a brass or copper tube for sugar evaporator work. Some information regarding the bi-metallic tube is to be found in your issue of March, 1910, entitled, "The Use of Aluminum for Non-Corrosive Purposes."

ALUMINUM COMPANY OF AMERICA.
E. C. WOOD.

Philadelphia, Pa., Nov. 3, 1910.

GUN METAL FINISH ON IRON AND STEEL.

To the Editor of THE METAL INDUSTRY:

In reference to the article by "Ionic," published in the October issue of THE METAL INDUSTRY, on a "Gun Metal Finish on Steel," I would offer the following comment:

Tillman's "Chemistry" says iron rust (common or "ordinary rust") is due to the formation of hydrated sesquioxide, the acids used producing first this action and $2Fe_2O_3$, $3H_2O$ being the final result or ordinary iron rust. In the equation given the writer has failed entirely to take into account the chemical action of the alcohol present, C_2H_5OH. If the HCl is the product, what has become of the other elements? C_2H_5OH is generally considered as a reducing agent; still, in the equation, the iron is oxidized. If it is the "binder," then the H_2O, Fe_2O_3 and HCl must exert no chemical change upon it. Can this be true of any hydrocarbon?

In the first formula Fe_2O_3 is said to be the result; then, when the article is removed from the steam chamber, it absorbs, presumably from the air, another molecule of iron, and in the second equation has the formula of FeO, Fe_2O_3, and by plunging into hot water is converted into Fe_3O_4.

Prescott and Johnson say that black magnetic iron shows that the color and properties are a chemical salt, and not a mechanical mixture of FeO and Fe_2O_3.

Remsen, Tillman, Simon and Fresenius say that Fe_2O_3 and subsequently Fe_3O_4 is due to the action of the air, carbon dioxide and water, the presence of any acid salt facilitating the rusting. Again, how can a solution of $2FeCl_3$ precipitate itself out as an oxide? It is barely possible that the alcohol evaporating causes a concentrated solution and consequent crystallization of the salt. I do not say the finish cannot be produced, for I have tried the formula and can get good results, but not always. "IRONIC."

MANGANESE BRONZE PROPELLOR WHEELS.

To the Editor of THE METAL INDUSTRY:

In the October number of THE METAL INDUSTRY appears an article on Parson's manganese bronze propellers as made at the plant of William Cramp & Sons, ship and engine builders. This article is very interesting but it seems to me that the practice of casting the hubs of propeller wheels of iron and the blades of brass or bronze went out of existence long ago. First class engineers long ago discarded this method for the better one of making the hub of bronze and the blades of bronze. I have been connected directly and indirectly with the Hyde Windlass Company at Bath, Me., for eighteen years or more and they have been making manganese bronze propellers all this time and I don't recall an instance where they made an iron hub and they have made some of the biggest, if not the biggest, propellers ever made.

This wheel made at Cramp's is no doubt the largest solid manganese bronze propeller, but it isn't the largest all manganese bronze by all means. The North Dakota and Minnesota, built at Groton, Conn., a number of years ago for the Great Northern Pacific line, had what are probably the largest wheels of manganese bronze ever made. The large modern boats have turbine engines, so they do not take as large wheels. The hubs of the wheels for the above named boats weighed between nine and ten tons each; each blade weighed between six and seven tons and there were four blades to a wheel, making one propeller, when all together, weighing thirty-three to thirty-eight tons, or 66,000 to 76,000 pounds. W. R. DEAN.

New Haven, Conn., Oct. 16, 1910.

The impression that the article referred to by Mr. Dean intended to convey was that the propeller wheel described was the largest Parsons solid manganese bronze wheel made in this country to date.—Ed.

ECHOES FROM THE OUTSIDE.

To the Editor of THE METAL INDUSTRY:

It is a pleasure indeed to note the amazing progress that you are making every month with THE METAL INDUSTRY and how anybody even remotely connected with the business of manufacturing the brasses and bronzes can do without it is past my understanding. I wish you well.

WILLIAM H. PARRY,
Superintendent National Meter Company.

Brooklyn, N. Y., Sept. 20, 1910.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—Kindly inform me through your journal what metals compose managanese bronze?

A.—A typical analysis of manganese bronze is as follows:

Aluminum	.10
Copper	56.45
Iron	1.54
Lead	.03
Manganese	.02
Tin	.60
Zinc	41.26

Different makers use different alloys in making their bronzes, but they proportion them so that they obtain approximately the above analysis. Among the different alloys used are ferro-zinc, ferro-manganese, manganese-copper, manganese-zinc and aluminum-manganese-copper.—J. L. J.

BLISTERING

Q.—Please let me know what causes blisters on cast iron work after it has been plated in a brass solution. Also what is a good method to polish tinned tubes which have to be brass plated?

A.—Blistering of a brass deposit may result from several causes: (1) Imperfect cleaning; (2) too strong a current; (3) too much free cyanide in solution; (4) too much arsenic —this is a frequent cause; (5) too concentrated a solution.

Blistering is sometimes caused by a poor quality of iron containing too much carbon. A safe course to pursue is to coat the iron in a nickel bath for five to ten minutes before immersing in the brass bath.

Use Vienna lime composition to polish the tinned tubes and moisten with a little kerosene oil. Do not use any cutting composition. A medium hard coloring buff will answer the purpose.—C. H. P.

BRIGHTENING

Q.—Is there any organic matter which can be added to a nickel solution that would assist the solution to throw a brighter deposit than can be obtained with the aid of single salts?

A.—There is no recognized brightener for a nickel bath the same as arsenic for a brass bath. Some operators claim to obtain excellent results by dissolving arsenic in hot muriatic acid in the proportion of four ounces to a quart of acid, when cold, adding a small amount as occasion requires it, as in a brass bath. Others have used a small amount of glucose or grape sugar. The arsenic may accomplish results, but care should be taken in not adding too much. It is best to try for results on a gallon of solution.—C. H. P.

Q.—How can I remedy a solution which contains too much carbon bisulphite, used as a brightener for a silver solution; also does the brightener have any effect in oxidizing the work?

A.—Boil the solution until the bisulphite of carbon is volatilized, and then allow to cool and filter the solution, adding sufficient water to replace the amount lost by evaporation. Bisulphite of carbon does not interfere with the oxidization of the silver surface. The brighter the surface the brighter the oxidized surface will be.—C. H. P.

CASTING

Q.—How can we obviate porosity in silver castings after finishing?

A.—Perfectly sound silver castings may be had by casting the silver in molds made of plaster of paris and abestine, thoroughly baked and cast preferably under pressure. This gives castings of sharp outline. Green sand molds faced with French clay and then skin-dried will often answer when only a few silver castings are wanted.—J. L. J.

COLORING

Q.—Is there a solution that will plate the color of oreide metal and not tarnish without lacquering?

A.—Oreide metal for casting consists of the following proportions:

Copper	94.08	per cent.
Zinc	2.80	" "
Lead	.67	" "
Iron	1.34	" "

To produce an alloy for plating, the above proportions would have to be followed closely. To give the requisite color we would suggest that you try a bath composed as follows:

Carbonate of copper	4 ozs.
Carbonate of zinc	2 "
Carbonate of nickel	1 oz.
Carbonate of iron	½ "
Cyanide of potassium	1 lb.
Water	2 gals.

Use anodes consisting of an alloy as above for casting metal.—C. H. P.

DEPOSITING

Q.—Can you give me any information concerning thick deposits of nickel or nickel alloy from cold solutions?

A.—Extra thick deposits of nickel can only be obtained by a specially prepared and agitated bath. The chemical composition of the bath is the same, but the density is increased by a larger proportion of the salts per gallon. An article that might interest you is one entitled "Dense Nickel Deposits by Continuous Filtration," by Charles Proctor in THE METAL INDUSTRY for May, 1907.

DIPPING

Q. We are having trouble in bright dipping large yellow brass brackets. Can you give us a remedy to prevent spotting-out within a day after finishing?

A.—Your trouble is due to the porosity of the castings. When cleansing with hot potash the metal expands and the pores become filled with potash. This is not removed sufficiently when washing before the regular acid dip. The cold water causes a contraction of the metal and the potash is still held in the pores of the metal. This works up through the metal after lacquering, producing the brown spots noted. It is more noticeable in damp or wet weather, or in the humid weather of the summer time. To overcome your difficulty boil out your castings after potashing for several minutes in a solution consisting of:

Water	1 gal.
Oil of vitriol	½ oz.

Then allow to cool without washing in cold water, and acid dip in the regular manner. Wash, and immerse in a warm solution of cream of tartar and water, one-half ounce of the tartar to each gallon of water. This dip may not be necessary, but it assists greatly in preventing spotting out. —C. H. P.

FINISHING

Q.—How can we obtain a high-grade blue finish upon bachelor buttons?

A.—Button manufacturers blue their product by heat. This is accomplished by using a revolving tumbling barrel made of heavy sheet iron, which is placed upon a shaft that extends through a furnace and of sufficient length so that the barrel can be withdrawn and emptied. The barrel is usually driven with a slow power, and clutches have to be arranged so that the barrel can be engaged or disengaged by the aid of levers. A coke furnace gives the best results. To produce a highly polished blue the articles must be given a good polish by tumbling previously in leather or by the aid of steel balls and borax water. The Techno-Chemical Receipt Book by Brannt would be of value to you.—C. H. P.

Q.—Will you please publish a formula for a lacquer that will give a dead black finish without plating?

A.—For your purpose procure a dead black lacquer from any plater's supply house or lacquer manufacturer advertising in THE METAL INDUSTRY. Unless necessary do not polish the surface of the gray iron. Cleanse it with hot potash or soda solution to remove grease, or this may be done with benzine or gasoline. Then hang the articles on iron wires and immerse in the black lacquer, and hang up to drain. Have a receptacle made so that the drip can be returned to the lacquer. When the articles are partly dry, which will be noted by becoming dead black, remove the drip from the edge hanging down with a camel's hair brush. The articles should then be dried in a heater at a temperature of one hundred degrees. If it is necessary to polish the articles, then you will have to follow the following method, as a polished surface does not cover so readily. Cleanse the articles as before mentioned, then immerse in a copper dip, consisting of the following:

Water	1 gal.
Sulphate of copper	1 oz.
Sulphuric acid	1 oz.

Give a quick immersion, then remove and rinse in cold water, which will give you a copper surface. Now immerse in a liver of sulphur dip, consisting of one ounce to each gallon of water, using the solution cold. This will oxidize the copper to a dark bronze tone. Rinse the articles in cold water, then dry out by the aid of boiling water. Now lacquer the surface as heretofore mentioned. This method will give you satisfactory results on a polished surface.—C. H. P.

OXIDIZING

Q.—Can you give us a green oxidize for brass, one to be applied the same as silver oxidize, so that it could be rubbed down after drying?

A.—For producing a green oxidize on brass preparre the following solution:

Boiling water	1 gal.
Hyposulphite of soda	8 ozs.
Nitrate of iron	8 ozs.

Cleanse the articles in the usual manner for plating, then immerse for a few moments until sufficiently green. Renovate, wash and dry. The relieving should be done with a scratch brush and pumice stone. If a more bluish green is required, instead of using nitrate of iron, use four ounces of acetate of lead, the other proportions the same as for darker green.—C. H. P.

PICKLING

Q.—Please publish formulas for hot and cold acid dips for removing fire coat from sterling silver.

A.—The dips you refer to probably consist of muriatic acid, two parts, and nitric acid, one part. This is used to absorb the copper from the surface of the silver. Another dip consists of one part of nitric acid and three parts of cold water; while a third dip is cyanide of potassium with the addition of a small amount of water of ammonia.—C. H. P.

PLATING

Q.—Will you please tell me what is the best way to add silver chloride to a silver solution? (2) When replenishing a copper bath with metal is it better to dissolve the copper salt in the copper solution and then clear it up with cyanide or cut the copper down with cyanide first and then add?

A.—The correct method to pursue when replenishing a plating solution is to produce a concentrated solution of cyanide of potassium, using as small an amount of water as possible, which should be cold or only slightly warm. Then add the metallic salts. Use equal parts by weight of the cyanide and salts, or even a less amount of cyanide. When saturated use the concentrated solution as a stock solution; filter before making additions, so as to prevent undissolved salts from entering the solution. Then if necessary add a small amount of cyanide to the bath as free cyanide. This can be determined by the color of the anodes and the internal resistance of the bath. The correct method to pursue when making additions to any solution is first to produce a fairly concentrated solution of cyanide of potassium by dissolving in cold or slightly warm water, then add the metallic salts. Equal parts by weight of cyanide and the metallic salt will give a concentrated solution, if only sufficient water is used for solution.—C. H. P.

SOLDERING

Q.—We have to make a tight joint between two pieces of steel with a hard solder. We find in using brass, too high a temperature is required. We want an alloy that will melt at about 800 to 1000 degs. Fahr. We have tried what is called steel solder such as is used on band saws and the melting point of this seems to be all right, but we have been unable to find a flux for this alloy other than borax, and borax takes to high a temperature. Can you tell us of any other alloy either on the market or that can be made that will melt at our required temperature, and can you give us information as to a flux that will do the work at about 800 or 1,000 degs.?

A.—There is no substitute for the so-called steel or silver solder. By using very thin sheets of the solder, say about 0.01 inch, you can reduce the quantity required. Borax is generally used as a flux for silver solder. By making a mixture of borax and boracic acid, a flux with a lower melting point may be obtained. For your class of work, oxy-acetylene welding ought to be very satisfactory, and would suggest that you enter into correspondence with manufacturers of this class of apparatus. —J. L. J.

STAMPING

Q.—Can you give us a formula for bronze dies to be used for drop-hammer work?

A.—For bronze dies we would suggest aluminum-vanadium-bronze made as follows: Melt 20 pounds of copper and 10 pounds of aluminum. Pour into ingots and use as a hardener. Then melt 70 pounds of copper, get very hot, and add 1⅔ pounds of 30 per cent. vanadium copper and 28 pounds of the hardener. Remelt for casting. Pour cold and make mold in a similiar manner to managanese bronze, as the shrinkage is similar.—W. J. R.

TARNISHING

Q.—What causes my old brass finish work to be stained and tarnished before lacquering?

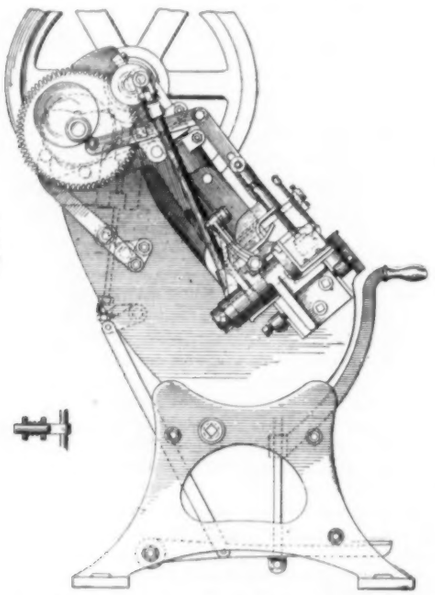
A.—If you will note carefully you will find that the staining occurs before lacquering. This will be in the form of a dark orange stain and is caused by the boiling rinsing water. To overcome your trouble, keep your hot water clean, do not let it boil. Add to each gallon one ounce of platers' compound and to fifty gallons of hot water water, two ounces of cyanide. You will find that this will overcome your trouble. Another method for old brass finish is to cut down with tripoli and then finish with a tampico wheel, using Matchless Metal Polish Company's Old Brass composition, then cleanse in benzine and dry in sawdust. This will prevent all stains.—H. H. P.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

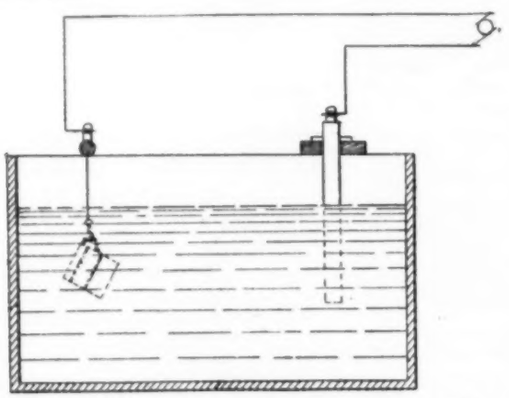
970,092. September 13, 1910. Automatic Die Press. C. D. McDonald, Chicago, Ill., assignor to McDonald Machine Company, Chicago, Ill.

The machine shown in cut was designed with the view of improving present types in use. Means are provided for automatically controlling the supply of vacuum used in lifting the



work into position to be inserted into guideways, from whence it is fed to the die members; for returning the work to normal position in case the lifting means are not in proper contact with the work and for automatically ejecting the stamped article from the male die member. The object of the present invention is to arrange and form the various mechanisms above referred to so as to improve generally the construction and operation of the machine as a whole.

971,641. October 4, 1910. Art of Enameling Metals. G. L. Rice and B. W. Gilchrist of Woodhaven, N. Y. Gilchrist assignor to Rice.



The inventors claim a method of enameling a metallic article, which consists in depositing, by the electrolytic process, by means of the apparatus shown in cut, on the article to be enameled, a coating of magnetic material and sulphur, and then applying the enamel. Also, the improvement in the art of enameling metallic articles which consists in interposing between the body of the article and the enamel a binding, coating or film of magnetic material containing sulphur.

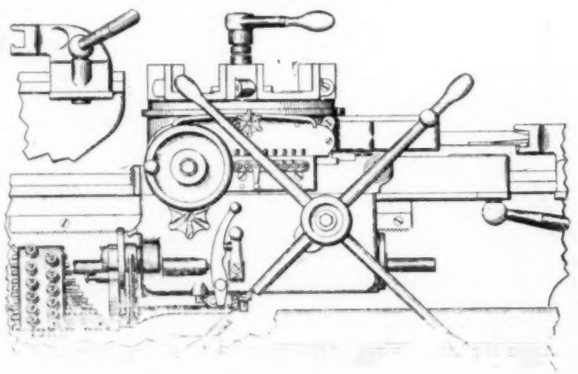
971,767. October 4, 1910. Thermo Electric Couple. A. L. Marsh, Detroit, Mich. Assignor to Hoskin Manufacturing Company, Detroit, Mich.

This invention provides a thermo-electric couple in which a positive element formed of an alloy containing a relatively small proportion of aluminum and a metal having the properties of nickel, in such alloy, is combined so as to obtain in co-operation with a nickel-chromium negative element, high electromotive force, a high melting point and a comparatively straight line electro-motive force-temperature curve.

The inventor claims: A thermo-electric couple, a positive element formed of an alloy containing less than 10% of aluminum and a metal having the properties of nickel, in such alloy, of obtaining in co-operation with a nickel-chromium negative element, high electromotive force, a high melting point and a comparatively straight line electromotive force-temperature curve. A thermo-electric couple having a negative element formed of a nickel-chromium alloy and a positive element formed of an alloy containing nickel and a relatively small proportion of aluminum and a thermo-electric couple, an electro-positive element formed of an alloy containing nickel and approximately 2% of aluminum.

971,886. October 4, 1910. Turret Lathe. Bengt. M. W. Hanson, Hartford, Conn. Assignor to Pratt & Whitney Company, Hartford, Conn.

This invention relates to that class of machines as shown in cut in which a rotary table or turret carrying a number of tools for producing different operations upon work is employed, and it comprises among its salient features a slide upon which the table or turret is mounted, means for adjusting said slide transversely of the carriage of the machine, and stop-mechanism for limiting the transverse movement of the turret-slide so that any tool may be brought into proper relation with the work to be operated upon with accuracy and expedition.



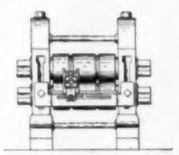
Other objects of the invention relate to improvements in the stop-mechanism carried by the support for the turret-slide, and to means mounted on the turret-slide and co-operating with said stop-mechanism to limit the movement of the turret-slide at predetermined points.

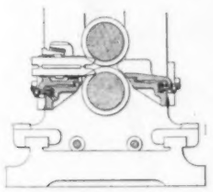
Other objects of the invention relate to improvements in means for actuating the carriage, for indexing the turret, and to improved stop-devices for limiting the longitudinal movement of said carriage in accordance with the character of work to be performed.

972,135. October 4, 1910. Process of Detinning. F. Von Kügelgen, Holcombs Rock, Va., and Geo. O. Seward, East Orange, N. J. Assignors to Tin Products Company, New York, N. Y.

A process for detinning iron scraps, which is operated as follows: The tin scrap is placed in any suitable vessel, and dry chlorin is introduced into contact with the scrap. The chlorin attacks the tin, forming stannic chlorid; the reaction is attended by acive generation of heat, and care must be taken to control the temperature and keep it sufficiently low. A temperature at the walls of the vessel of below 100 degrees Fahrenheit (38° C.) is preferable, but so long as the temperature does not rise so high as to make it impossible to hold the hand against the vessel (140 degrees Fahrenheit), the process can be successfully practiced. At these relatively low temperatures the iron is attacked only very slightly (about to the extent of its alloy with the tin of the coating), while practically all of the tin is converted into stannic chlorid. If the temperature rises too high, the underlying iron also is attacked, so that it is of great importance to prevent any serious rise of temperature. The temperature may be kept down either by cooling the vessel or by sufficiently limiting the amount of chlorin which enters the vessel. The temperature should be maintained high enough to secure a complete detinning. To accomplish this the temperature should approximate 100 degrees Fahrenheit; if it falls much below this the process becomes too slow to be practicable.

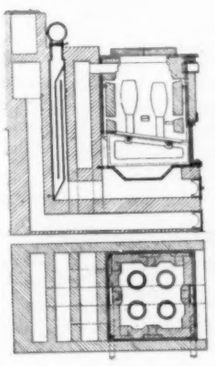
972,219. October 11, 1910. Guide for Rolling Mills. Theodore H. Nye, Worcester, Mass. Assignor to Morgan Construction Company, Worcester, Mass.





The object of this invention is to provide an improved mode of attachment for rolling mill guides which will secure maximum rigidity and also facilitate their application to and removal from a rolling mill housing, and it consists in the construction and arrangement of parts as shown in the cut.

Among other things the inventor claims: A rolling mill housing having a guide supporting bar, a guide mounted thereon, said guide and said bar provided with re-entrant engaging surfaces for holding said guide from vertical movement, but arranged to allow horizontal movement away from the rolls of the rolling mill, said bar having a slot parallel with said surfaces, said guide having a depending flange outside of said bar, and a bolt held in said slot and passing through said flange arranged to draw said guide toward the rolls of the rolling mill.



972,703. October 11, 1910. Crucible Furnace. Wm. Miller, Wellington, England.

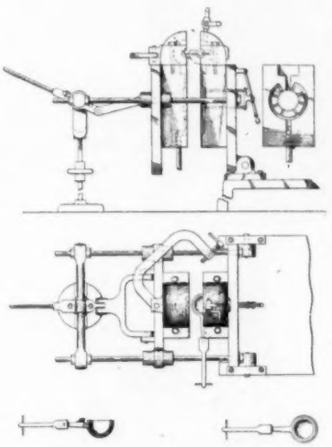
This invention relates to crucible furnaces for melting steel and other metals and it consists firstly of an improved construction of such furnaces as shown in cut in which the primary air supply for combustion of the coke or other fuel used to heat the crucible is heated in an arrangement of regenerative flues disposed contiguous to the waste gas flues and also supplemental air so heated is supplied to the furnace over the fuel to effect complete combustion of the fire gases arising from the fuel around the crucible.

972,325. October 11, 1910. Process of Coating or Facing Molds. Geo. H. Babrook, Taunton, Mass.

This is a process for making molds, consisting of forming the body of the mold out of moist molding sand upon a pattern, then withdrawing the pattern and applying intermediate the pattern and the mold a layer of facing material mixed with a volatile liquid, such as benzine, then replacing the pattern and applying pressure to force the facing layer into intimate contact with the mold while the facing material is still permeated with the volatile liquid.

973,483. October 25, 1910. Art of and Apparatus for Casting Fluid Metal. H. H. Doehler, New York, N. Y.

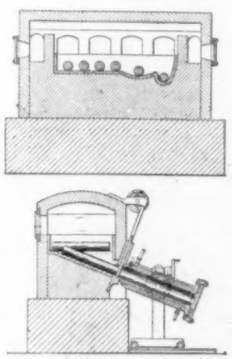
The main object of this invention is to provide a method of casting fluid metals having a high fusing point, such as brass or aluminum, capable of being conducted under such conditions as will permit the production of commercial castings in large quantities from one and the same mold.



The principal points of the invention are covered in the following claim: In an apparatus shown in cut for casting fluid metals the combination of a sectional mold, a head forming a pressure chamber surmounting said mold and adapted to be opened, whereby specific gravity will initiate the flow of the fluid metal to said mold, the said head and the walls of the opening thereof having a tapered bearing, means forming a constricted passage way between said pressure chamber and the interior of said mold, a ladle the handle of which is tapered to conform to said bearing and which has a shoulder thereon adapted to engage the exterior of said head, said ladle being adapted to contain a measured quantity of molten metal and means whereby an elastic fluid under compression may be introduced to said chamber to follow up the metal through said passage way and force it into and compress it in the mold.

972,561. October 11, 1910. Method of and Apparatus for Producing Coated Metal Objects. J. F.Monnot, New York, N. Y. Assignor to Duplex Metals Company, New York, N. Y.

This invention provides a method and apparatus shown in cut for producing coated metal objects, particularly compound ingots comprising unlike metals weld-united, and consists in means whereby a billet or object to be coated may be heated to a high temperature while immersed in a bath of flux or like fused protective material, and may be transferred to a mold while still submerged in such protective material, and then may have a layer of molten metal cast about it and united to it as the metal so cast solidifies.



The invention further consists in the process comprising the heating of an object to be coated, under protection of an enveloping bath of fused protective material, transferring the object while still so enveloped to a suitable mold, and casting a body of molten metal or other suitable material into said mold and against the surface of the heated object and causing the metal so cast to solidify against each object; the metal so cast being cast through a deep body of the molten protective material within the mold and displacing such material, the latter therefore serving as a wiping material for the molten metal, whereby the molten metal as cast is purified and freed from entrained and occluded gases, oxid impurities, etc.

The same inventor has obtained two other patents, No. 972,629 and 972,630 for Method of and Apparatus for Producing Coated Metal Objects and Process of Making Compound Metal Bodies.

INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

BOLAND PATENTED HOT BLAST DRYING MACHINE.

The machine shown in the cut, Fig. 1, is manufactured by H. J. Astle & Company, manufacturers of the Boland line of hot blast drying machines, sawdust boxes and lacquer ovens of Providence, R. I. The machine is the invention of F. P. Boland, and a description of it is given in patent specification No. 969,453 issued September 6, 1910.

The object of the invention is to produce a self-contained drying-machine for drying articles of jewelry, etc., in which the several operative parts or elements thereof are disposed so as to be readily and conveniently accessible, while at the same time being more compact and possessing greater efficiency than machines of this general type heretofore devised.

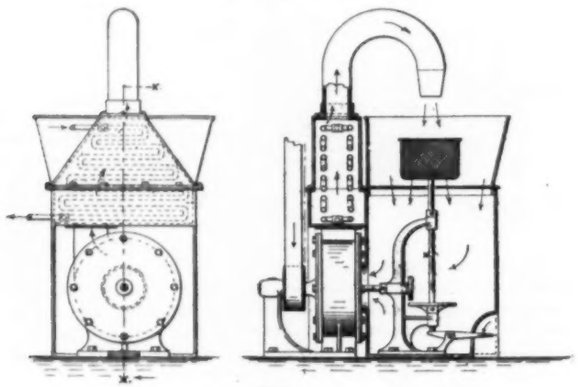


FIG. 1.

The machine shown in cut is operated as follows: The work or articles of jewelry are first placed in a holder or basket, the heated air discharged from a nozzle, as well as outer air, passes downward through the basket and a partition into a relatively cool air-chamber and is then drawn or sucked through an opening direct into the blower. The action of the blower forces the cool air through its discharge nozzle into a chamber where it (the air) is heated, while at the same time any vapor or moisture present is evaporated from it. The thus heated air passes freely through an opening at the top of the chamber into a bent tube and is discharged from an outlet-nozzle, thus completing the air circulation.

FIG. 2. STYLE 1—BOLAND DRYING MACHINE.

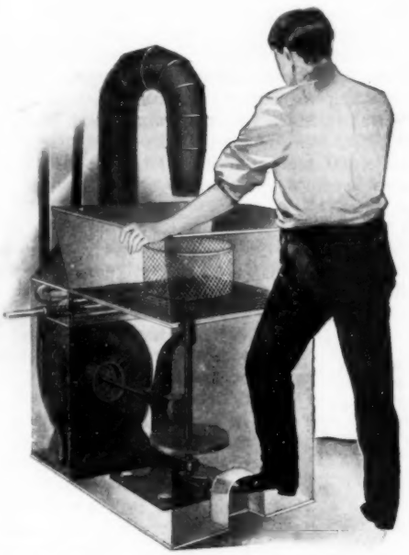
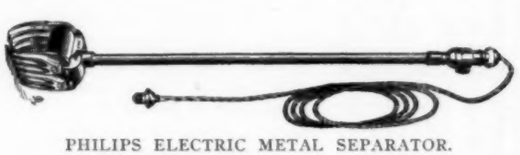


FIG. 3. STYLE 2, BOLAND DRYING MACHINE.

These machines are used for drying silverware, jewelry, brass findings and metals of all kinds instantly. The machines are made in two styles, Nos. 1 and 2, and in sizes 16 by 24 inches and 20 by 30 inches for style 1, and in one size 20 by 30 inches for style 2. The No. 2 style is fitted with a centrifugal attachment, as shown in cut Fig. 3, the operator puts his foot on the lever and the basket revolves. Full information regarding this apparatus is given in a booklet free upon application published by the Astle Company.

ELECTRIC METAL SEPARATOR.

A portable magnetic separator operated by 110 volt circuit as shown in cut is manufactured by Donne & Co., 4944 Wabansia avenue, Chicago, Ill. This separator can be handled very easily and advantageously by simply connecting the plug to an ordinary



PHILIPS ELECTRIC METAL SEPARATOR.

lamp socket, and then running the separator forward and back through borings spread on the floor until the iron is entirely removed by the separator from the brass. The separator is removed and the iron is dumped by simply shutting off the current. A capacity of eight hundred pounds of metal cleaned per hour is claimed for this piece of apparatus. Further information will be furnished upon request.

PORTABLE SCHWARTZ FURNACE.

The Hawley Down Draft Furnace Company have recently placed on the market a portable type of furnace, shown in cut, which consists of their regular Schwartz furnace with the portable attachment. The Trefeliers et Laminoirs of Havre, the largest concern of their kind in France, have recently equipped their foundry with these portable furnaces. The furnaces are supported by pneumatic hoists, which are supported by trolleys, which run around the walls of the foundry, and the furnace is so carried to individual moulds, where the pouring takes place, and by means of hoists can be lowered or raised to the proper point. The double gearing on the furnace permits its use as a stationary furnace when desired. In all events, when the pouring is not taking place, the hoists may be used for other purposes throughout the foundry.

By eliminating the transferring of the metal into ladles a great saving is effected; for instance, if the metal must reach the moulds at say 2,200 degs., it is necessary in almost any kind of a tilting furnace to have it 200 degs. more in the furnace, as the temperature will drop some 200 degs. in the

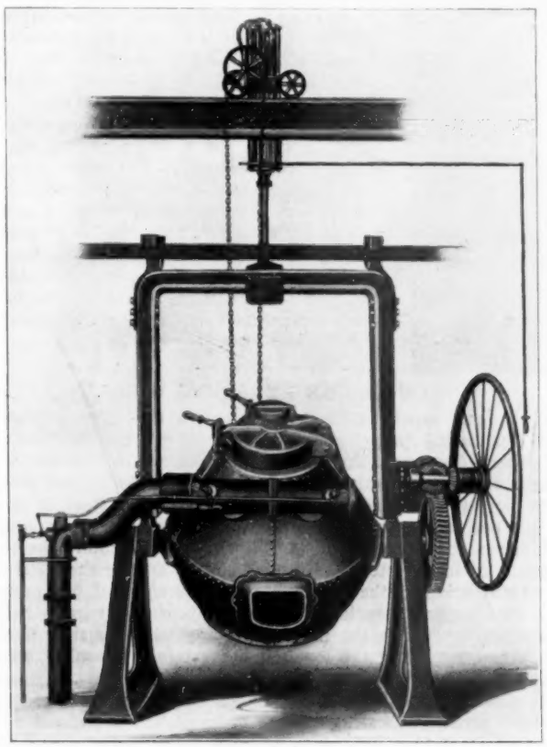


FIG 2. FRONT VIEW OF THE FURNACE, SHOWING ITS SUPPORTS.

ladle. It is therefore obvious that if the metal need be heated to only about 90 per cent. of what it previously was heated to, that a great saving in both fuel and loss by oxidization will be effected. The French concern states that their time of casting has been reduced some 20 or 30 per cent., and inasmuch as it takes but 20 or 25 minutes to get the metal hot in a Schwartz furnace, they are doing very quick work. The Hawley Company is doing considerable business abroad and have just completed the equipping of three railroad foundries in New Zealand and two in Australia, in which latter place some forty odd furnaces have been in use for a number of years.

THE BUFFALO AIR BRUSH.

This air brush is a simple machine, and is claimed by the makers to be just what is needed at all times in every factory to take the place of the complicated and delicate air brushes now on the market.

It is made of aluminum and brass and is very light, making it convenient to handle and regulate.

The brush shown in cut is said to be particularly adaptable for auto or carriage work, interior decorating, outside painting, pattern work, china and pottery decorating, gilding and tinting statues, bronzing picture frame moldings, stencil work, iron bedsteads, card writers, souvenir post cards, furniture of any kind, fancy goods, novelty manufactures, metal decorations, addressing

THE BUFFALO AIR BRUSH.

packing cases and other articles or any business using paint, varnish, bronze, enamel, water colors or dry powders.

The brushes are made for any kind of work, and furnished for hand and power outfit by F. J. Lederer Company, 400 Guilford street, Buffalo, N. Y.

THE ABBOTT TANK MAGNET.

We show on this page an illustration of the Abbott tank magnet, which is intended for use in recovering articles that have dropped to the bottom of the plating tank, potash, acid or cyanide solution.

This magnet is manufactured by the Hanson & Van Winkle Company, manufacturers of electroplaters' chemicals and supplies, polishers' and buffers' materials, Newark, N. J. They say

THE ABBOT TANK MAGNET.

of this instrument: The Abbott tank magnet will recover at once any particle from a pin to a piece weighing five pounds, and without roiling the solution. Simply attach one binding clip to the anode rod and the other to the cathode rod of any tank that is connected with the dynamo.

It is indispensable for cleaning out the tank at the end of the week, as it removes all the work that has accumulated at the bottom. This is important, as the parts are injurious to the solution, and often cause short circuits. This magnet separates iron and steel from brass and copper, and can be used for removing the work from leather or sawdust in dry tumbling. It will soon pay for itself in time and labor, to say nothing of the convenience of being able to get instantly any important piece that has been lost.

They are perfectly willing to send one of these on approval, to be returned at their expense if not satisfactory.

THE PANGBORN IDEAL SAND DRYER.

A sand dryer that is claimed to incorporate all the scientific principles of operation that make it not only the quickest portable dryer for floor space required, but also the most economical fuel user as well, has been put upon the market by the Thomas W. Pangborn Company, of New York. By the use of the machine shown in the cut the wet sand is kept from direct contact from fire in the firebox and the moisture is carried away from the sand during the drying process by air currents. This is accomplished by the screen, as shown in the illustration, the shape of which is that of an inverted funnel, and its neck surrounds the chimney. The diameter of the conical part being greater than that of the firebox, makes the necessary air space between the two. By means of this arrangement the damp sand is kept away from the firebox, and thus allows the heated air to pass freely under the sand, carrying away the moisture, while the sand as it becomes dry drops through the screen and runs down the inclined surface of the firebox on to the floor.

PANGBORN IDEAL SAND SIFTER.

The dryer is adapted to use with hard or soft coal, coke or wood, and is equipped with oil and gas burners. The dryer stands four feet from the floor to the top of the hopper. The hopper is four feet in diameter on the top and thirty-six inches at the bottom. The base of the machine is thirty inches in diameter and has a height of eighteen inches from the floor to the top of the firebox. The weight of the apparatus is fourteen hundred pounds. Additional information may be obtained by writing to the above company.

A PLATER'S MAGNET.

The magnet shown in cut is manufactured by The Meaker Company, job galvanizers and installers of electro-galvanizing plants, Chicago, Ill.

In the past platers have invariably used hooks, tongs, rakes, etc., to locate lost pieces; a very uncertain and time wasting process, and a method quite impractical if the tank is loaded with work. To stir up sediment and dirt always present at the bottom of plating tanks, is fatal if good deposits of metal are to be obtained. In short, the old methods of recovering lost articles consume time and injure solutions and both mean an actual loss of money.

By the use of this magnet, it is only necessary to snap the spring connectors in place on the anode and cathode rods, slowly lower the magnet into the solution and recover the lost piece or pieces, then gently withdraw the magnet, work in the process of plating is not disturbed and the solution remains clear and unchanged. Three styles of magnets are carried in stock as follows: Style No. 1, Wound for 3 to 6 volts; Style No. 2, Wound for 6 to 10 volts; Style No. 3, Wound for 10 to 15 volts, to meet popular shop voltages; each can be used on a slightly higher voltage for a short period without injuring the magnet. The style numbers simply designate voltage and not size. Each magnet is 4 feet in length, weighs 7 pounds packed for shipment, and will lift 15 pounds. They are furnished with wooden handles and their length enables the operator to search the deepest tank without getting his hands into the solution. All magnets are guaranteed for one year.

NEW TOGGLE EMBOSSING PRESS.

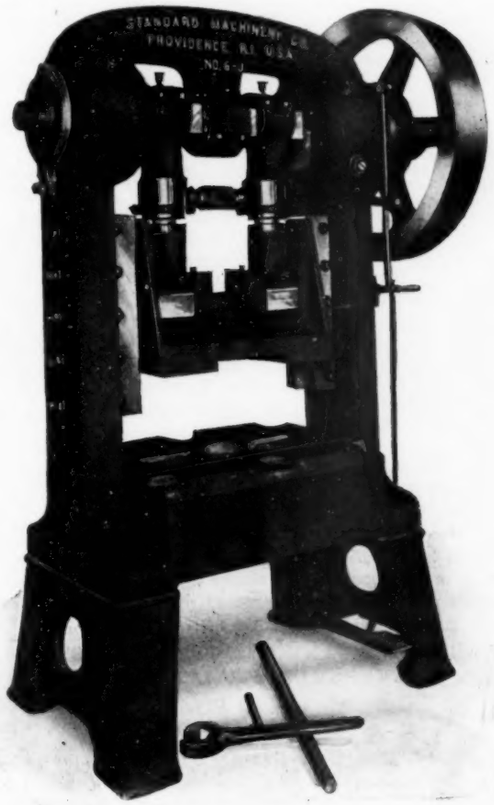
The press shown in the cut is known as Style G, knuckle joint embossing press, and is manufactured by the Standard Machinery Company, Providence, R. I. The machine has a net weight of 13,800 pounds; the frame is of cast steel, and weighs 7,000 pounds; the tensile strength of the cast steel is 80,000 pounds per square inch; the crankshaft is of forged nickel steel and drives the main toggle in a horizontal direction; the main toggle is of forged steel and bronze bushed around the wrist pin. The main drive in the toggle has a net weight of 600 pounds. The two vertical toggles which constitute the toggles which straighten out where the pressure is applied in vertical motion are forged steel, and the lower one seats in a phosphor bronze thrust shoe which is in the cast steel slide of the press. The supporting pin of the slide as well as the two toggles are of hardened and ground tool steel, with oil groove. The maximum width through the section is 12 ins., and the maximum distance from front to back is 27 ins.

The builders call special attention to the extra heavy reinforced uprights and to the solid cast steel boxes on the driving or gear shaft which are all bushed with phosphor bronze. The driving shaft is fitted with a 1,300-lbs. fly wheel, 42 ins. diameter, 7-ins. face. This is put in close to the frame, supported by heavy outboard bearings. The opposite end driving shaft is equipped with a forged steel pinion driving into a cast steel clutch driving gear. Both pinion and clutch gear have cut teeth and the gear is fitted with an instantaneous patented roller friction clutch which is capable of withstanding an unusual heavy duty, and at the same time having features of the instantaneous stop allowing less than 1/32-in. travel of the fly wheel after the clutch is engaged.

On this particular clutch the dog or latch for stopping is fitted with a special counterweight for high speed and to relieve the strain of a quick stop. The adjustment is controlled by the hand wheel on the front of the press and consists of hardened and ground tool steel wedge between wedge collars, and adjusting screw running through the arch of the press, and controlled by large swivel wrench, the collars shown in cut acting as check nuts. With this wrench it is possible to lift the entire weight of the plunger and toggles with comparative ease. The machine has

both hand lever and treadle tripping device, and is set upon substantial cast iron base, which is hollow below.

The distance between uprights at the bed of the press is 17½ ins. and the medium distance is 15¾ ins. When there is a hole in the bed it is regularly made 5 ins. diameter, but could be made as large as 15 ins. diameter, or as large as 15 ins. from right to left or from front to back. For special purposes the machine could be built with a minimum space of 8 to 12 ins. between uprights at the point of contract for small pieces requiring heavy pressure for formation. The steel and ram being of cast steel, the gibs are made of fine cast iron, forming an excellent bearing surface, and are extra long, giving the slide a bearing during its entire length. The press is made both plain and geared; net weight of plain press being 12,500 pounds and the size of the balance wheel on plain press weighs 1,800 pounds and is 50 ins. diameter. The pressure developed by the back geared press is 350 ton at the bottom of the ram.



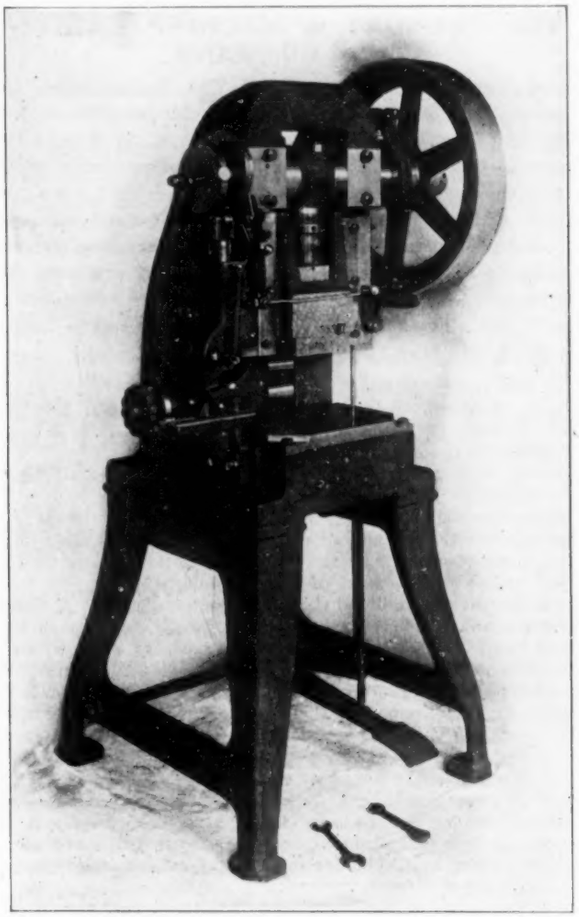
TOGGLE EMBOSSING PRESS.

THE "BAIRD" TRANSFER PRESSES.

This press is a new design, specially built heavy for heavy blanking and stamping, and is furnished with seats or pads so that a plain press can first be obtained, then later attachments, which can be easily applied without necessitating shipping the press to the factory, which is a feature peculiar to "Baird" presses. The transfer attachment takes the place very largely of work commonly done in a cut and carry press, but is very much cheaper in first tools, cost and up-keep, as but one set of side tools are required and the degree of accuracy is not required in transfer tools as is required with a set of cut and carry tools.

The automatic stop furnished with this attachment positively stops the press should the blank for any reason not be transferred to its proper position, which is a feature that saves manufacturers very many dollars in damages to tools. The open back press is furnished either with a side or back roll feed which can be adjusted to feed the metal in either direction by simply throwing a pawl over the center. The lifting pin attachment is for raising stamped articles out of the die to facilitate their being knocked off. The friction dial attachment can also be supplied with a positive stop which stops the press automatically should the dial fail to turn to its proper position, again saving many dollars' damage to the goods.

These attachments can also be applied, especially designed for the purpose, of course, to pillar pattern presses, as shown by the accompanying illustration. These presses are finding a ready market among jewelry, novelty brass and steel goods manufacturers, and is found to be a very handy press, on account of its universality. Full and detailed information can be obtained from "Baird" Bulletins No. 202 and No. 204, copies of which can be obtained from the builders, the Baird Machine Company, Oakville, Conn.



BAIRD MACHINE COMPANY'S BLANKING AND STAMPING PRESS.

PLATINUM SUBSTITUTE ALLOY.

William C. Finck, a manufacturing jeweler of Elizabeth, N. J., has patented an alloy which is a substitute for pure platinum for many purposes and only costs about 3 per cent. as much. It melts at a temperature of 2,600 degs. Fahr., which is 600 degs. lower than platinum and does not corrode or tarnish under the influence of the atmosphere or acid fumes, but is slightly discolored by sulphur. When drawn into wire it has a tensile strength of 88,000 pounds per square inch, annealed soft. It is claimed to wear as well and better than gold and not to be distinguishable from platinum when alternated with gold in chains. It is being used for diamond mounting and jewelry and it is believed will make good ignition points for spark plugs and possibly also may be available for use in cauterizing instruments and wood burning tools.

Associations and Societies

DIRECTORY OF AND REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

THE FOUNDRY & MACHINE EXHIBITION COMPANY.

President, Geo. R. Rayner, of The Carborundum Co., Niagara Falls, N. Y.; Treasurer, J. S. McCormick, of J. S. McCormick Co., Fittsburg, Pa.; Secretary, C. E. Hoyt, Lewis Institute, Chicago, Ill., to whom all correspondence should be addressed. The objects of the Association are for the commercial and technical education of iron and metal industries by co-operating with all foundry and manufacturing interests in making an annual exhibit of supplies and equipments in conjunction with the meeting of the American Foundrymen's Association.. The next exhibit and convention will be held in Pittsburg, Pa., May 23, 1911.

At the annual meeting of the executive committee of The Foundry & Manufacturers' Supply Association, held at Fort Pitt Hotel October 11, 1910, the directors of the Foundry & Machine Exhibition Company submitted the following:

Executive Committee The Foundry & Manufacturers' Supply Association.

Gentlemen:—The Foundry & Machine Exhibition Company is organized for the purpose of making exhibits of machinery and foundry supplies of all kinds. This organization is incorporated under the laws of the State of Pennsylvania, with a capital stock of $25,000, divided into 250 shares, par value of $100. A liberal amount of stock has been subscribed by the the charter members. There still remains a certain amount of treasury stock which is offered to the members of The Foundry & Manufacturers' Supply Association and other prospective exhibitors, and will be opened to subscription on the basis of $33⅓ per share until December 1, 1910, but no subscriptions for less than three shares, amounting to $100, nor more than six shares, amounting to $200, will be received. The exhibits of the Foundry & Machine Exhibition Company will be conducted along the same general lines as those held by The Foundry & Manufacturers' Supply Association. In this connection we wish to state that it is not necessary to become a stockholder in order to exhibit and enjoy all the exhibition privileges.

It is the belief of the organizers of this company that it will be in a position to conserve the interests of all concerned.

The following are charter members of The Foundry & Machine Exhibition Company:

E. H. Mumford, Mumford Molding Machine Company.
L. L. Munn, Jr., Arcade Manufacturing Company.
R. S. Buch, A. Buch's Sons Company.
Wilfred Lewis, The Tabor Manufacturing Company.
H. R. Atwater, The Osborne Manufacturing Company.
H. F. Frauenheim, The Herman Pneumatic Machine Company.
F. N. Perkins, Norcross Molding Machine Company.
Henry A. Pridmore, Henry E. Pridmore.
J. W. Campbell, The Cleveland Wire Spring Company.
E. A. Pridmore, The Edward A. Pridmore Company.
J. S. McCormick, J. S. McCormick Company.

The above statement is submitted for your favorable consideration.

Respectfully,
FOUNDRY & MACHINE EXHIBITION COMPANY.

On motion of Mr. E. H. Mumford, seconded by Mr. H. M. Bougher, of J. W. Paxson Company, the communication was accepted and ordered placed on file.

Mr. E. J. Woodison, of the Detroit Foundry Supply Company: "In view of the fact that the new organization has made such progress I beg to submit the following resolution:

"RESOLVED: That The Foundry & Manufacturers' Supply Association be disbanded and that the treasurer be empowered to remit all moneys in his hands to the members *pro rata*, after defraying all outstanding liabilities. The foregoing resolution to be submitted to the members not later than October 20, in writing, and their ballot returnable not later than October 30, and if not returned at that time in writing their acquiescence thereto to be taken for granted." This motion was seconded by Mr. J. S. McCormick and carried unanimously.

It was moved by Mr. F. N. Perkins, and seconded by Mr. H. R. Atwater, that The Foundry & Manufacturers' Supply Association remit all obligations due from the General Foundrymen's Committee of Detroit on account of their pledge of $1,200 in connection with the 1910 exhibit, and that they give us a receipt in full for all claims that may arise hereafter in that connection. This motion was carried unanimously.

The Board of Directors of the Foundry & Machine Exhibition Company announced that the officers of The Foundry & Manufacturers' Supply Association had been unanimously elected officers of the Foundry & Machine Exhibition Company for the fiscal year beginning on the last Monday in October. The officers are as given at the heading of this article.

Under date of November 1 Secretary Hoyt reports that the ballot returns have been practically unanimous in favor of the resolution of the executive committee. He will therefore proceed to have the books audited, sell all the association fixtures, and then pro rate and pay to the members the cash balance on hand. There will be no more salaries paid after this date and no expenses incurred except the auditing of the books, and the small amount of clerical work required in making final settlement.

NEW ENGLAND MANUFACTURING JEWELERS' AND SILVERSMITHS' ASSOCIATION.

President, Geo. H. Holmes; Treasurer, Wade W. Williams; Secretary, Frederick A. Ballou, all of Providence, R. I. All correspondence should be addressed to the Secretary, Providence, R. I. The objects of the Association are for the commercial and educational welfare of manufacturing jewelers and silversmiths.

Industrial education was the main topic of discussion at the annual corporation meeting of the association held at Freemason's Hall, Providence, R. I., on the evening of Oct. 29. Upward of 150 members from Providence and the Attleboros were in attendance and the meeting was one of unusual importance. After the dinner the meeting was called to order by President George H. Holmes, who read his annual address which reviewed the conditions that have existed during the past year and discussed the various matters that have interested the industry during that period. At the conclusion of his address he presented Past President Harry Cutler with a handsome solid silver pitcher on behalf of the association.

The committee on by-laws reported a revision of the old code which was adopted. In the change there is a section which provides that the president shall appoint the members of the advisory council within ten days after the annual meeting. Heretofore they have been appointed at the annual meeting. The following officers were elected: President, George H. Holmes, of Providence; Vice-Presidents, Theodore W. Foster, of Providence, Harold E. Sweet, of Attleboro and Charles T. Paye, of North Attleboro; Secretary, Frederick A. Ballou, of Providence; Treasurer, Wade W. Williams, of Providence; Directors, William P. Chapin, of Providence; Frank B. Reynolds, of Providence; Harry M. Mays, of Providence; Arthur O. Ostby, of Providence; Alfred K. Potter, of Providence; Edward B. Hough, of Providence; Ralph C. Thompson, of Attleboro; Walter B. Ballou, of North

Attleboro; William T. Chase, of Providence; William H. Bell, of Attleboro Falls; and Samuel M. Einstein, of Atteboro. President Holmes announced the appointment of Ralph S. Hamilton and George H. Cahoone both of Providence as members of the auditing committee.

After the business addresses were made on the subject of industrial educations by Russell C. Lowell, of the Technical High School of Providence, who gave a very clear explanation of what the co-operative course of which he is the head is trying to do for the young men in the way of an industrial training and Augustus S. Rose, in charge of the jewelry and silversmithing department of the Rhode Island School of Design, spoke of the work that is being done in that institution. William J. H. Boetcker, of Toledo, O., Secretary of the Citizens' Industrial Association of that city, concluded by speaking on "The Problems of Life."

NATIONAL ELECTROPLATERS' ASSOCIATION OF THE UNITED STATES AND CANADA.

President, Charles H. Proctor, Arlington, N. J.; Treasurer, H. H. Reama, New York, N. Y.; Corresponding and Financial Secretary, Geo. B. Hogaboom; Recording Secretary, Royal S. Clark. All correspondence should be addressed to the Corresponding Secretary, Geo. B. Hogaboom, 656 Hunterdon St., Newark, N. J. The objects of the Association are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets at Grand Opera House Building, 309 W. 23d St., on the fourth Friday of each month, 8 p. m.

The twenty-first regular meeting of the association was held Friday evening, Oct. 28, at the Grand Opera House Building. When President Proctor called the meeting to order there were thirty members present. The regular routine business was transacted, during the course of which ten active and one associate members were elected to the association, as follows: Active —Henry Ritter, New Britain, Conn.; E. Bentley, Sumter, S. C.; L. E. Sturtevant, Binghamton, N. Y.; Harry Betts and John E. Grant, West Lynn, Mass.; George Kutzen, Detroit, Mich.; Wm. Miller, Slatington, Penn.; James S. Phelps, Newark, N. J.; Richard Zuckerman, William Matz, Jr., and George H. Chandler, New York, associate.

The banquet committee reported that preparations were rapidly going forward to hold the banquet early in February, 1911, possibly Saturday, the 11th. This date, however, is subject to change. At this banquet it is expected there will be a number of men prominent in the electroplating business, who will speak.

The corresponding secretary, George B. Hogaboom, then took up considerable time, during which he expounded upon the benefits and advantages to be derived from the association, and read a number of letters from members residing in various parts of the country, which letters evinced considerable enthusiasm, and showed a strong desire on the part of the writers to be instrumental in establishing branch associations, particularly in Chicago and Detroit.

It was decided that associate members will hereafter be allowed to take an active part in the discussions of the association, excepting to hold office or to vote for the election of officers.

The secretary was instructed to write a letter to Percy S. Brown, now residing in Chicago, expressing the association's views as to the interest he took in the association, and wishing him success in his new field.

It was finally voted to grant a charter to the recently organized Philadelphia branch, and a committee, consisting of William Schneider, chairman, A. D. Havens and Richard H. Sliter, to draw up a form of charter, which will be presented to the Philadelphia branch. As so much time was consumed in the discussion of general business, the topic for the evening, "The Electro-Cleaners," was put over until the next meeting.

The second regular meeting of the Philadelphia branch of the National Electroplaters' Association was held in Philadelphia, at Dooner's Hotel, on Friday evening, Oct. 28. President Clements called the meeting to order, with twenty members present. After the routine business was transacted the subject of electro-cleaners was discussed by William J. Buckley and William Minds, and interesting information was evolved.

The next meeting of the association will be held on Friday, Nov. 25, at which time President Clements will read an article entitled "An Interesting Subject." The name of the recording secretary is Joseph L. Dinan, 2549 N. 48th street, and the chairman of the board of trustees is Hugo Hermanns, these names being erroneously reported in the October number of THE METAL INDUSTRY.

ITEMS OF INTEREST TO THE INDIVIDUAL.

Edward F. Mullard, formerly foreman plater for Edison's Phonograph Works, W. Orange, N. J., has gone to Providence, R. I. Where he will have entire charge of the plant of J. C. L. Shabeck, manufacturing plater.

Willard Carroll, recently mechanical engineer for Peck, Stowe & Wilcox Hardware Company, Southington, Conn., has become superintendent for the Rome Brass & Copper Company, manufacturers of brass and copper sheet metal and tubing, Rome, N. Y.

W. R. Dean, 133 Edgewood Avenue, New Haven, Conn., formerly foundry foreman of the Lumen Bearing Company, Buffalo, N. Y., has accepted the position of foundry superintendent with Peck Brothers & Company, manufacturers of plumbers' brass goods, New Haven, Conn.

W. R. Hughes, Cincinnati, Ohio, has severed his connection as Western representative for the Levett Manufacturing Company, manufacturers of platers' supplies, New York, and is now connected with F. B. Stevens, manufacturer of and dealer in foundry and platers' supplies, Detroit, Mich., in the same capacity.

Herbert Gray Torrey, for thirty-seven years chief assayer, U. S. Assay Office, New York City, and Charles Taylor, Jr., for twenty years in charge of the U. S. Assay Office Laboratory, have opened a consulting assayers and metallurgists office at 99 John street, New York, under the firm name of H. G. Torrey & Company.

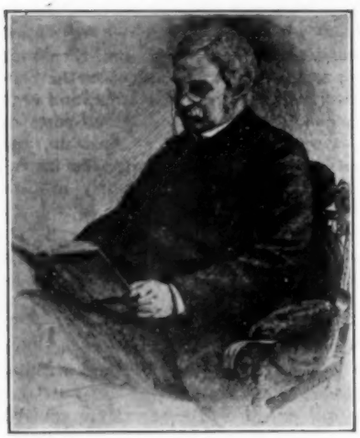
James S. Phelps has resigned as foreman plater from the Bunting-Stone Hardware Company, Kansas City, Mo., to take a similar position with the Rajah Auto Supply Company, Watsessing Station, Bloomfield, N. J., where a new plating plant has recently been installed by The Hanson-Van Winkle Company of Newark, N. J.

F. Stebbins has taken the position of polisher and plater for the F. H. Koretke Brass & Manufacturing Company, manufacturers of repair parts for all classes of machinery, and electrical appliances and castings in phosphor bronze, aluminum bronze, manganese bronze, tobin bronze, Muntz metal, etc., of New Orleans, La., to succeed William Obernesser, who recently resigned.

William Schwemmer, who has been connected with the J. K. Osborne Manufacturing Company, manufacturers of metal novelties, of Harrison, N. J., for the past twenty years, reports that he has been foreman plater for the concern for fifteen years. He says that he was not promoted to be foreman upon the retirement of August Hoffman, as was published in the September number of THE METAL INDUSTRY.

RECENT DEATHS OF MEN PROMINENT IN THE BRASS INDUSTRY.

FREDERICK J. KINGSBURY.



FREDERICK J. KINGSBURY.

Frederick J. Kingsbury, of Waterbury, Conn., died at his summer home in Litchfield, Conn., on Sept. 30. Mr. Kingsbury was really the foremost citizen of Waterbury and had for years been a prominent factor in its financial, industrial and social activities.

Frederick John Kingsbury, LL.D., was born in Waterbury on New Year's day, in 1823. He was the only son of Charles Denison and Eliza (Leavenworth) Kingsbury. He came from an old and distinguished New England family, Henry Kingsbury, his first American ancestor having come to this country from Assington, Suffolk County, England, with Governor John Winthrop. He was one of the founders of Ipswich and later settled in Haverhill, where he became one of the influential citizens of the town. The family left Haverhill in 1707, coming to Norwich, where they took an active part in the affairs of the town and State. Charles Denison Kingsbury, father of Frederick, was a prosperous merchant and farmer, who held the offices of town treasurer, selectman and member of the school board.

GRADUATED FROM YALE IN 1846.

The family came to Waterbury before the birth of Frederick, who was a quiet boy and of rather delicate health. He grew from childhood under the watchful care of his mother, his teacher for several years. His later education was secured in the schools of the town and he also spent a year and a half of study with his maternal uncle, Rev. Abner J. Leavenworth, in Virginia. He completed his preparations for college at the Waterbury Academy under the tutelage of Rev. Seth Fuller, and went to Yale University, from which he was graduated in the class of 1846. He afterward studied law in the Yale Law School under Judge Storrs and Isaac H. Townsend and with the Hon. Charles G. Loring of Boston and the Hon. Thomas C. Perkins of Hartford.

He was admitted to the Boston bar in 1848 and in 1849 opened a law office in Waterbury. In 1853 he abandoned the practise of law for the business of banking, in which and in manufacturing and other affairs he was from that time on successfully engaged. For the past half century he had been an intelligent director of large manufacturing, financial and railroad enterprises.

It was in 1850, when he was representing Waterbury in the legislature, that he had his attention first directed to savings banks. He obtained a charter for the Waterbury Savings Bank, was appointed its treasurer and had administered its affairs ever since. In 1853 he established the Citizens' Bank, of which he was the first cashier and the third president, having held that office since 1868.

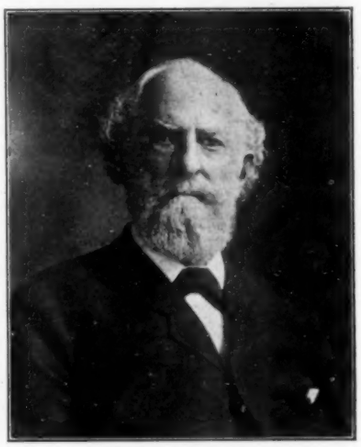
Mr. Kingsbury was prominently connected with the Scovill Manufacturing Company, being made a director in 1858. He became secretary and treasurer in March, 1862. He succeeded S. W. Hall as president in 1868 and held that important office until 1900.

Mr. Kingsbury was secretary of the Detroit & Lake Superior Copper Company, and for a number of years a director of the New Haven Railroad. Always interested in literary affairs, he served as treasurer of the Bronson Library Fund and as member of the board of agents and as chairman of the book committee of that institution.

Mr. Kingsbury was not only a banker and business man of great ability, but was a man of literary taste and a writer of more than average ability, beginning his literary career at the age of seventeen, writing for a newspaper and continuing in his college days, when he was a contributor to the Yale Literary Magazine. His published writings include many valuable sociological contributions and historical papers sent to the magazines and newspapers and a history of St. John's Church. He was one of the principal writers of the "History of Waterbury," and had an exceptional knowledge of his native city, probably more exact and far-reaching than that of any other resident, with the exception of the Misses Pritchard.

On April 12, 1851, Mr. Kingsbury married Miss Alathea Scovill, daughter of William H. Scovill. Mrs. Kingsbury died in 1899. They were the parents of five children, William Charles, who died in childhood; Mary Eunice, the wife of Dr. Charles Stedman Bull, of New York, who has also passed away; the Misses Alice E. and Edith D. Kingsbury, of this city; and Frederick John Kingsbury, of New Haven. These survive their father, with five grandchildren, Kingsbury, Ludlow and Miss Dorothy Bull, of New York, and Miss Ruth Kingsbury and Frederick John Kingsbury, 3d, of this city.

PHILIP CORBIN.



PHILIP CORBIN.

Philip Corbin, president of the American Hardware Corporation and founder of P. & F. Corbin, died at his home in New Britain, Conn., on Thursday, Nov. 3, 1910, aged 86 years and 8 days.

Mr. Corbin was a native of Connecticut; he was born at Willington in 1824. His early life was spent there, and at Ellington and West Hartford. He attended district school and worked on the farm for his father and neighbors. In 1844, when 20 years of age he started out in the business world of New Britain, working for a contractor in the shop of Matteson & Russell Company, afterwards Russell & Irwin. In the Fall of the same year he started to learn the trade of making locks, and in sixty days he became a contractor on his own account. In 1848 Mr. Corbin formed a partnership with his brother Frank and Edward Doen under the name of Doen, Corbin & Company, and manufactured hardware. In 1849 Edward Doen was bought out and the firm became P. & F. Corbin, which still continues at the present time. The American Hardware Corporation, with Philip Corbin as president was formed in 1902, which combined the firms of Russell & Irwin Manufacturing Company and P. & F. Corbin. Mr. Corbin in March, 1903, formed the Corbin Screw Corporation to manufacture screws and screw machine products. In June of the same year the Corbin Motor Vehicle Corporation was incorporated.

His outside business interests were not many, as he preferred to give all his time and attention to the companies created by him. He was, however, at the time of his death, President of the New Britain Machine Company, the Porter & Dyson Company, the Savings Bank of New Britain, the Calumet Building Company, the D. C. Judd Company, the H. R. Walker Company, and the Whiting Land Company.

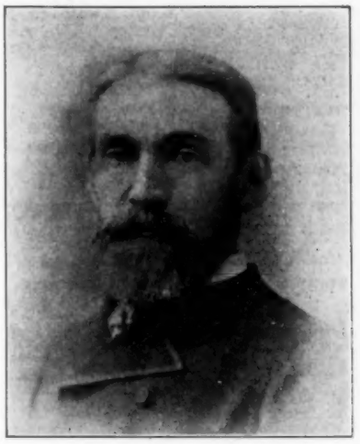
The ever-increasing burden of business cares, together with the weight of years, hastened the process of laying upon the shoulders of his associates the responsibilities connected with the management of the various companies he had created, and at the time of his death he retained only the presidency of the American Hardware Corporation and a place in the board of directors of each of the constituent companies. The men who have taken up the burden have had years of constant association with him and the advantage of a training in the policies that have given Philip Corbin his success and there will be no change or interruption due to Mr. Corbin's death.

Mr. Corbin's business career is unique in that it covered a period of sixty-six years of active life. Sixty-one years were spent in the management and development of a single enterprise engaged in the manufacture of hardware. The capital invested has grown from nine hundred dollars to ten million dollars, and the number of persons employed from three only to ten thousand.

Of a family of ten, three survive him—a brother, Elbert A. Corbin, and two sisters, Lois and Ann Corbin. His son, Charles F. Corbin with his two children, Philip Corbin Jr. and Mrs. Minnie Corbin Kohn, and grandson Philip Corbin Kohn (Mr. Philip Corbin's great-grandson), are the only direct descendants.

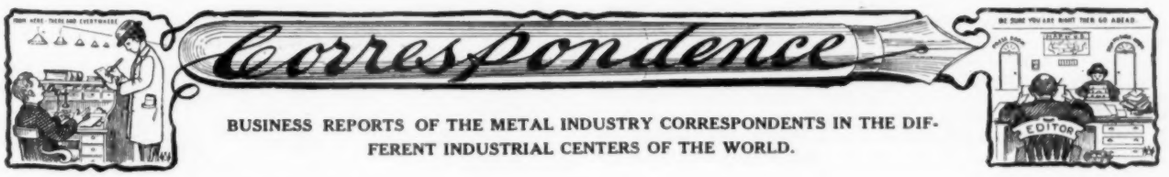
JOHN HARLIN.

John Harlin, the senior member of McNab & Harlin, founders and manufacturers of brass goods of Paterson, N. J., died at his home in New York, October 29, aged 83 years. Mr. Harlin was born in Ireland and came to this city when a small boy and learned his trade of brass founder. In 1854 the firm of McNab, Carr & Harlin was formed and operated a plant on Ward street, Paterson, N. J., and continued until the outbreak of the Civil War. At the beginning of the war the firm failed and Mr. Carr retired.



JOHN HARLIN.

At the close of the war the firm of McNab & Harlin opened up a plant on Straight street, where the business was so successful that it was enlarged many times. It is now one of the largest of its kind in the world. Mr. Harlin always resided in New York City, where he looked after the New York end of the business and consequently became very well known in the New York business world, by whom he will be greatly missed.



BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

Nov. 7, 1910.

Waterbury had the greatest sensation in years industrially during the past month, when a crew of private detectives called upon the police to arrest thirty-five employees of the Scovill Manufacturing Company and junkmen on charge of thefts of metal goods. Of the number arrested all but some six or seven were found guilty of theft on one or more counts and both fines and jail sentences were handed out by the city court. The cases are now nearly all cleared up but appeals have been entered in a few instances.

The raid of the detectives was one of the most sensational in years. For an extended period Chauncey P. Goss, Jr., of the Scovill company had been quietly working on a number of cases of a suspicious nature. The company had been unable to account for a large amount of metal, but at the same time was unable to locate the leakage. In the final effort to prove or disprove their suspicions the company's executive officers put Chas. E. Hazelhurst, of Norwich, a former State policeman, now a private detective on the case. He worked on it for some time before he made any headway and finally prevailed upon the company to hire in four men who worked in the shop as members of the night and day shifts for four months. Having finally accumulated considerable evidence of thefts, the cases were turned over to the prosecuting attorney. Mr. Goss left his bed and with the police was on the scene when the first raid of the plant was made. In relays the men were rounded up, some at their work, some at their homes, between four in the morning and noon when the last of the crowd was locked up.

Some of the men were accused of taking out pieces of metal in their dinner pails, others with hiding it and selling it to junk dealers. One of the men, a foreman was found guilty on several counts and fined heavily in addition to a sentence of seven months in jail. In the plunder which was seized in all parts of the city where there were junk yards or in the homes of the factory hands were found metals of all descriptions from copper ingots to large quantities of the large and small brass parts of watches and clocks. Indeed there is a considerable portion of the plunder which has not yet been identified, which was at first thought to have come from some of the watch shops, but which none would claim.

The Scovill company would give out no definite statement as to their probable loss, but the officers interviewed admitted that the peculations had been in progress for several years and that the loss to their company was probably in the neighborhood of $10,000. The raid attracted the attention of the entire city and manufacturers or their representatives from plants both in and out of the city were interested in the seizures of stolen goods and the inside facts of the thefts. So far as is known, however, no steps were taken previously in other factories to detect possible leaks of this nature and the moral effect of the raids at Scovill's undoubtedly is strong enough to make it unnecessary to do so for some time to come.

There are some who severely criticize the company for allowing such methods to prevail in their factories that theiving of this sort is encouraged. There are scores of plants all through the Naugatuck valley which have so-called "scrap heaps" and "dump heaps" in which all kinds of metal scrap is thrown, and with these existing it is well nigh impossible to keep an accurate check on stock. Although they are most progressive in practically every department, the American characteristic of wastefulness is present here and lessons that should have been learned long ago from kindred concerns, in this country as well as abroad, seem to have been overlooked. Some of the greatest factories in the world have long since adopted the practice of selling their waste or scrap every day, thus removing temptation from the paths of their employees.

Waterbury really is not in such dire straits that shop hands need to steal to get a living. There is plenty of business in nearly every plant here and, while one or two departments in some are dull, others are busier than ever before at this season. This is particularly true of the Waterbury Clock Company. The New England Watch Company also is busy, and while some departments of the Chase Rolling Mills Company are running but five days a week there seems to be plenty for the employees of the Waterbury Manufacturing Company to do and the Scovill, Randolph-Clowes, Plume and Atwood, Benedict and Burnham, Waterbury Brass and other large factories are busy. Full time is being maintained in the plant of the Benedict and Burnham Company (part of the American Brass Company) to complete a large order for the United States Navy, chiefly in tube products. These are being turned out at a rate of about 100,000 pounds a day.

Another surprise in industrial circles this month was the announcement of the Baird Machine Company, of Oakville, that it had decided to remove its plant to Bridgeport in view of the difficulties it had encountered in trying to secure sufficient territory to provide for future expansion. Through the co-operation of Fred Enos, of the Bridgeport Board of Trade, the firm has secured a promising site and has already set in motion the plans for the construction of a fine new plant for the manufacture of special machinery dies and its various metal products. The negotiations were completed in Bridgeport, Saturday, Oct. 15, and simultaneously the company issued to the Waterbury and Bridgeport papers statements of its developments and plans for the future to set

aside contradictory and confusing reports from unauthentic sources which had been flying about for months. The removal of the plant from here to Bridgeport will not be consummated for some time.

The Manufacturers Foundry Company has issued contracts for a one-story addition to its plant.—F. F. B.

PROVIDENCE, R. I.

Nov. 7, 1910.

All lines of the metal industry in this vicinity are doing a good business with prospects encouraging for some months to come. The manufacturing jewelers have numerous orders on their books, although the season has not yet opened up as briskly as was anticipated. Practically all the shops are running full time, some are working evenings, and few, if any good workmen can be found out of employment. As has been previously referred to there is one branch of the jewelry industry, mesh bags and purses, that is simply overwhelmed with work and orders coming in constantly. Many of the manufacturers of these articles notified the trade several months ago that they could not book any more orders for immediate, or even dated delivery.

At this season of the year when the manufacturing jewelers are usually operating their plants until 9, 10 and even 11 o'clock every night, the number following this custom this year is comparatively small. One of the principal reasons for this is to be found in the law passed by the General Assembly last January, which forbids the working of women and minors more than 56 hours each week, and limiting the time of day that these hours shall be in vogue between 6 in the morning and 8 at night.

Many of the manufacturers, however, are finding a partial relief by allowing all the help who wish, to take certain portions of the work home with them and do it there evenings. As this is voluntary on the part of the operatives and the law prescribes their working in "shops or other establishments of labor," it is claimed that there is evasion of the law. The law was obtained through the energies of organized labor leaders, hoping to force the manufacturing jewelers to operate their plants with regular time schedules the year round. These leaders were none of them jewelers or familiar with the peculiar conditions that govern the working hours of the industry. Much dissatisfaction is expressed by the employees who desire to take full advantage of the business conditions and work when they can get the work to do, fully realizing that overtime is necessary during and just preceding the holidays to fill rush orders and that such overtime merely balances up for time lost at other seasons of the year when the business is slack.

At this particular time the manufacturing jewelers are being hampered in the delivery of their goods by another labor movement, the express employees' and messengers' strike in New York city. The majority of the shipments made by the jewelers are by express, very little being done by freight. Advises received within a few days from the consignees in New York suggest the sending of all packages possible by the mail with register and where necessary special delivery stamps. It has already been demonstrated that such packages will be delivered in the jewelry district of New York by 8 o'clock in the morning or shortly afterwards whereas express packages under the most favorable conditions fail to reach their destination until afternoon.

The new building which the Gorham Manufacturing Company is erecting on the south side of its bronze foundry at the firm's plant in Elmwood is rapidly nearing completion. This new structure is to be used for the setting up of large bronze castings, of which the company has a large number on orders. Work on the building is being pushed with as much rapidity as possible on account of the imperative necessity of more room for the assembling work. Much space is required for setting up these large bronzes, of which the massive equestrian statute of General Hancock for the City of Philadelphia now finishing is an illustration, and there is not sufficient room to do this work freely in the present quarters devoted to this growing branch of the company's business.

Thomas F. Sisson, of this city, claims that he has discovered a new device for core-makers' use. The contrivance is said to possess the utility and novelty necessary to constitute it a new invention in the line of foundry equipment. Two of the features of the device are a combination pin and a collapsible book flask. These features are now ready for inspection, but the other features of the device, about four in number, are as yet in an incomplete stage though certain of perfection, the inventor claims. The discoverer of this innovation has devoted much time to effect its consummation. For ten years he was connected with the Providence plant of the American Locomotive Company, but was transferred to the Pittsburg branch in 1908, when the local concern discontinued its operations. Mr. Sisson had already made a study of the mechanism of foundry machines before he left this city and he augmented his knowledge of the subject during his stay in Pittsburg. Mr. Sisson has returned to this city and has introduced his idea at the Miller Foundry Company.

The Metal Products Corporation has recently purchased a lot of land on the west side of Eddy street, this city, adjoining their property at the corner of Thurber's avenue. An addition to their plant is under contemplation.

H. J. Astle & Company, tinware, are being driven to their capacity by orders for pressure blowers, polishing benches and other appurtenances for jewelry shops. In other lines they are also very busy.

Horace F. Carpenter recently celebrated the 50th anniversary of the establishment of the metal refinery business now conducted by himself and son by entertaining the firm's employees at a banquet. Addresses were in order and during the evening Mr. Carpenter was the recipient of a huge bouquet of carnations one in number for each year of his age, the occasion also being his birthday.

The Providence Sheet Metal Company are very busy on ornamental architectural work in this city and vicinity. They have a force nearly double in number that of a year ago and find hard work in keeping pace with their orders. Two good contracts were placed within the last few days.—W. H. M.

BUFFALO, N.Y.

Nov. 7, 1910.

Buffalo's trade is reported generally as not over-rushed with business. Particularly is this true of the metalware industry, and although the departments are running, most of them, on full time yet the managers state that more orders could readily be taken care of. However, the trade during the past two weeks has picked up and a good winter's work is expected in every line. Wholesalers have their lines fully completed and the manufacturers have supplied the demands so that the report of the sales conditions from the men on the road are of interest. There is a general brisk buying in the West. The South follows with a fair amount of orders while in the third place may easily be counted the Middle West and the East. In the latter locality the trade is gradually picking up.

The manufacturing jewelers, however, are very busy as they have been during the past month. The retailers all over the city are now well stocked for the Christmas trade with novelties and staple goods. Among the manufacturing jewelry concerns increased business calls for additions to the force of employees. Silver goods and optical goods are in demand and a fairly good business in these two lines are reported.

Keen interest has been taken by the trade generally in the Buffalo Industrial Exposition which was held in the Arsenal on Broadway in October. Buffalo manufactured goods were the only goods displayed and every inch of space in the great building was occupied. The arrangements for display were ideal and inducements were made to the surrounding towns to come in and view the exhibit and the hall was crowded every afternoon for the entire two weeks. One of the most interesting exhibits was that of the Republic Metalware Company. They occupied two spaces of 144 square feet each and displayed every kind of enamel and tin ware, tiny pill boxes, novelty coffee cups and coffee urns. Their big drawing feature was a woman made out of tin cans. She wore a tin can hobble skirt, carried a bird cage for a hand bag, and wore an inverted milk pail on her head for a hat.

One of the most beautiful exhibits of the Exposition was that of the Heintz Art Metal Works. Everything in the way of an artistic desk appointment was displayed in hand wrought goods. They had some original designs in inlaid brass and copper which were greatly admired. This firm makes a specialty of the finest trophies and cups and their display was the center of attention.

The Buffalo Wire Works Company had an exhibit which occupied about 144 square feet. Their inclosure was made of the various wire weaves of their own design and manufacture. Wire weaves for cashier cages, for screen signs and entire lockers made an instructive display. Another attractive exhibit was that of the Brown Stamping Works. The Jaynes Electrical Company had a display of electric light fixtures showing handsome brass finishings.

In the optical department of King & Eisele, wholesale manufacturers of jewelry, the firm has just added three new Toric machines.—Mc.G.

DETROIT, MICH.

Nov. 7, 1910.

There has been no particular change in the brass industry in Detroit during the past thirty days. The same conditions prevail that have made the industry in the manufacture of automobile parts vigorous. Every factory in this line has been rushed with orders during October. Many are already at work on their 1911 machines and are booked with orders that will require all of next year to fill. The majority of the automobile factories in Detroit now are maintaining high class brass and aluminum establishments in connection with their factory plants. They are employing the most expert technical men to be found in the business. Added to that they insist on skilled mechanics. As a result, other brass establishments throughout the country that are engaged in other than automatic work are having difficulty in keeping their employees. High wages are paid and the men are assured steady work the year round. No day passes but that the newspaper columns are full of advertisements calling for expert brass men to engage in the automobile line.

The Buick plant at Flint, Mich., which was idle for a short time during the summer, is now operating full blast, giving employment to over five thousand men.

The brass and aluminum establishments engaged in other work than that of the manufacture of automobile parts report a fair line of trade for the past month. The business might be better, but the outlook is thought by the optimistic ones to be improving gradually and that the coming winter will see many orders from all parts of the country. The demand for manufactured copper to be worked by the automobile plants is of course brisk and will be much better when the automobile factories push their business during the winter months.

Detroit manufacturing jewelers are looking forward to a good trade this fall and winter. Already they are making plans for the Christmas trade. Many new designs in novelties will be placed on the market.—F. J. H.

CLEVELAND, OHIO.

Nov. 7, 1910.

The business outlook in this city, so far as those firms engaged in the metal industry are concerned is as good as it has been at any time this year. Factories are running full blast for the most part and plenty of orders are coming in, though collections are not reported to be quite as brisk as might be desired. The winter season, however, promises to see a good run of business. The automobile trade has settled down into a more complacent state than during the late summer and early fall and the manufacturers are now beginning to turn out stock for spring delivery in quite large quantities. Preparations are already being made for the big midwinter automobile shows, which promise to be quite as successful as usual.

Business with the plumbing goods manufacturers is unusually good at this season. The demand for brass faucets, fittings and similar goods is strong. Equally as brisk is the call for aluminum castings of different sorts. Aluminum is finding its way into many new channels constantly and when once used is very often permanently adopted where lightness is the quality desired.

Several good sized factories in this city devoted to the manufacture of brass and copper novelty goods, for sale as Christmas presents, report an exceedingly busy fall. All the big stores are showing extensive lines of brass and copper goods, at prices which attract the purchasers, for not only novelty but the lasting qualities of such things appeals.

Stockholders of the Bishop & Babcock Company, of Cleveland, received notice last week that a merger was being considered with several other companies. The concern manufactures soda fountain and bar apparatus of all kinds. The plan is to merge the company with the Liquid Carbonic Company and the L. A. Becker Company, both of Chicago. If the merger goes through the company will become the Baur, Bishop, Becker Company. The Bishop & Babcock Company has been enjoying an excellent business this summer and has just let a contract for the erection of another large factory building at its plant on Hamilton avenue near E. 49th street. It will be a four story brick and timber structure.

A new factory building, fifty by two hundred feet in size and costing $25,000 is to be erected by a Cleveland contractor for The McCasky Register Company at Alliance, O.

On Monday, Oct. 31. The Webb C. Ball Company, manufacturing and retail jewelers, moved into its palatial new store at 1114 Euclid avenue after having occupied a building at the northeast corner of Superior avenue and W. 3rd street for many years. The new store is in the heart of the fine new retail districts where fireproof skyscrapers are going up like mushrooms. The new store is in a building owned by Mr. Ball, and is over 100 feet deep and about thirty feet wide. It is fitted with elaborate mahogany cases on both sides in which a splendid collection of jewelry, plated ware and solid goods was displayed. In the rear is a four-story building which will be used for manufacturing purposes. The watch factory, however, is to remain at the old building for the present.—S. L. M.

CHICAGO, ILL.

Nov. 7, 1910.

The tight money situation and the demoralizing effect of current political conditions are having a tendency to hold up all lines of the metal business. A revival of the brisk business of a few months ago is not expected until the political atmosphere is clear and the bumper crops have begun to move. The railroads which are the greatest consumers of metal in Chicago are not buying. Railway supply houses, such as Crerar-Adams Company are hardly in the market at all for new supplies. A local refining plant reports that they have not received an inquiry from the Pullman company for three months. When such a large consumer is holding up its orders the trade must be very quiet. But what is true of the metal industry is true of all other staple lines. Business is stagnant and the watchword seems to be "retrenchment." A local jobber says that business men were never so sensitive to general conditions as new. The lightest rumor will cause delays and the holding up of orders. Elections will have to pass before business will resume its normal condition.

Copper is following steel. The truth of this old business axiom is now being demonstrated. Copper has slumped and the big mills are not producing to half of their capacity. The same is true of other metal lines. Sheet and plate copper which usually runs along steadily throughout the year is suffering from the same effects that are disrupting other lines. The Liquid Carbonic Company, makers of soda fountains, and the Western Electric Company have been the most persistent buyers of the month. The Northwestern railway has not been in the market at all during the last month.

The mills of the Chicago Metal Reduction Company which are probably the largest in Chicago are not running to their fullest capacity, which is accounted for by the fact that the Western producers are holding up their regular production.

The Crerar-Adams Company have moved from their old building at Lake street and Fifth avenue which they have occupied since the time of the great fire into their new seven-story building at 259 East Erie street. This is one of the most modern buildings in this new Chicago factory district. Mr. Ford, purchasing agent says that they have been cramped for space in their old building for several years past. This company is one of the largest buyers of metal in the city.

Crane & Company, owning one of the largest refineries in Chicago, has not been in the market for new metal for several months, as their practice is to buy the second hand metal of the city and refine it in their own plant. They use an immense quantity of copper, zinc, lead, etc., but owing to the above arrangement are seldom in the market for new metal. This is the method of several of the big consumers of metal in Chicago and accounts for the small volume of new metal business done.

The busiest people in the trade right now are the brass specialty manufacturing companies. Their orders in hand for metal fixtures of all kinds is keeping their factories running to their fullest capacity. The general fine outlook for holiday buying is responsible for the present rush of the fixture and novelty makers factories.—C. N. S.

A novel event in foundry customs occurred the evenings of November 8 and 9 when the Hinman Bronze Foundry, of Plainfield, N. J., invited the residents of that city to see the fine bronze work produced by a foundry in their own town. The exhibition included a magnificent set of bronze doors for the estate of the late E. H. Harriman, the railroad magnate. Besides displays of bronzes there was an example of pouring molten metal into molds and showing the resultant castings.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK

Additional Trade News will be found under "Correspondence."

The Eureka Pneumatic Spray Company have established a retail store for the sale of their sprayers and enamel lacquers at 276 Spring street, New York.

THE SIMMONS MANUFACTURING COMPANY, Kenosha, Wis., manufacturers of brass bedsteads, have leased the entire fifteenth floor of the new building at 334 Fourth avenue, New York City.

A. H. Wells & Company, Waterbury, Conn., are making good progress with the building which is being added to their plant. It is 102x64 feet in size, and is being constructed of concrete, brick and wood.

The J. Bernard Company, manufacturers of metal novelties and art goods, have established a manufacturing plant, containing 17,000 square feet, in the Herger building, 422-430 East 53d street, New York City.

Rockhill & Vietor, 114 John street, New York, report that in the future they intend to ship with all "Nonesuch" electroplating machines extra fittings which will make the "Nonesuch" a very handy plating tank for rack and strung work.

The Dayton Bronze Bearing Company, Dayton, Ohio, has been incorporated with a capital stock of $20,000 by William B. Israel and others. This concern has taken over the Dayton Brass Foundry and will make a specialty of railway and engine bearings.

The Naugatuck Chemical Company, Naugatuck, Conn., are now selling their products direct to the trade instead of through sales agencies, as formerly. Their special manufactures are sulphuric, muriatic, nitric, acetic and hydrofluric acids, and aqua fortis and Glauber's salts.

The Marshall Furnace Company, manufacturers of Wolverine Furnaces for all kinds of fuel, Marshall, Mich., are preparing to erect new shops in order to take care of their rapidly increasing business. This company operates a tinning shop and an iron foundry.

Lander and Larsson, 164 Edmund street, Birmingham, England, have been appointed by the Abbott Ball Company, manufacturers of steel balls for burnishing small metal goods by tumbling, Hartford, Conn., as their British representatives, and will handle their goods in that country.

Two smaller sizes of burnishing balls have been recently added to the products of the Abbott Ball Company, Hartford, Conn. These balls are 3-32 and 1-16 of an inch of a diameter and satisfy the demands of jewelers and manufacturers of optical goods better than the larger sizes.

"Miller Limited" have purchased the plant formerly owned by the Labatt Manufacturing Company of London, Canada, and are now manufacturing plumbers' and steamfitters' brass goods, also brass and white metal castings, rough or finished. W. J. Miller is secretary and treasurer.

The Ruggles Machine Company, Poultney, Vt., has started the erection of a new modern foundry to take the place of the one destroyed recently by fire. The company operate a brass and bronze foundry in connection with their iron foundry and will soon be in the market for new equipment.

The Light Manufacturing & Foundry Company, manufacturers of auto parts and aluminum castings, of Pottstown, Pa., report that they are contemplating the erection, in the early spring, of a foundry building, 60 by approximately 150 feet, which will be equipped with the latest improved equipment.

The directors of The Western Electric Company, Chicago, Illinois, at a recent meeting, authorized the expenditure of approximately $900,000 for extensions and improvements to its Hawthorne, Illinois, plant. A new switchboard building will be erected and other improvements made to the property.

The Pilling Brass Company, of Waterbury, Conn., report that they have already rolled three thousand pounds of brass for use in the radiators of flying machines. The material was high brass, .0035 thick. Mr. Pilling, proprietor of the Pilling Company, looks forward to a good future business with the builders of aeroplanes.

A recent change in the Duplex Metals Company, 149 Broadway, New York, is an addition to its works at Chester, Pa., of a one-story building, 50 by 70 feet, where the company will establish its main offices. Branch offices will also be established in St. Louis, Mo., and Portland, Ore. The present New York office and show room will be retained.

Henderson Brothers, Waterbury, Conn., have been very busy manufacturing their well-known tumbling barrel, which they fit up when so desired for any special purpose, so that the wants of their customers are exactly satisfied. They are shipping many of their standard styles, as well as the special styles to customers both in this country and abroad.

The Mohawk Welding Company, Schenectady, N. Y., have established a shop at Albany, N. Y., in which they are operating the oxy-acetylene welding and cutting process. This process is applied to the welding of copper, brass, aluminum and other metals. Information regarding the process may be obtained by communication with the above company.

The business of the Nordberg Manufacturing Company, engine designers and builders, Milwaukee, Wis., has increased to such an extent that it has been found necessary to increase the capital stock of the company. A large foundry was put up during the year 1909, to which additions have since been made and considerable money has been invested in necessary extra equipment.

The Aluminum Cooking Utensil Company, of Pittsburg, Pa., manufacturers of the major part of the aluminum utensils which are made in America, have just issued a new price list with prices revised downward. They also announce that they are advertising their aluminum ware extensively in various journals, intending to push aluminum ware to a greater extent than ever before.

The Edward A. Pridmore Company, manufacturers of molding machines, Chicago, Ill., has recently been incorporated. The officials are Edward A. Pridmore, president, who was associated with the late Henry E. Pridmore as superintendent; W. W. Miller, vice-president, who was designer and special sales representative; D. C. Snow, secretary and treasurer, who was office manager.

Two recent sales of Bilz sand sifting and mixing machines, which have been described recently in THE METAL INDUSTRY, have been made to J. B. McCoy & Son, 114 West 30th street, New York, and to the Singer Sewing Machine Company, Elizabethport, N. J. These machines are manufactured by the Bilz Sand Mixing and Sifting Machine Company, 1314 Findlay avenue, New York.

The Wolverine Aluminum & Brass Foundry Company, Jackson, Mich., are now occupying their new foundry building recently completed. The equipment consists of six crucible melting furnaces, an Adams molding machine, a Hammer core machine, a Wright band saw, a Globe rattler, Sterling grinder and

various other necessary appliances for a complete foundry equipment.

The Backus & Leeser Company, 410 and 412 West 13th street, New York, have concluded arrangements with the Eager Electric Company, Watertown, N. Y., manufacturers of dynamos for electro-plating, electric cleaning, etc. This company manufactures a complete line of these machines and the Backus & Lesser Company will carry a stock of them at their warerooms.

The Atlas Machine Company, Waterbury, Conn., are now located in their new shop at 140 Manhan street, which is near the Naugatuck River. They occupy the entire floor of a new concrete and brick building, 85 x 45 feet and have a good equipment of machinery. They started with twelve men and now have eighteen at work. They are builders of foot and power presses and special machinery.

The Yates-Upholt Brass Company, Plymouth, Mich., are intending to move their factory to Saginaw, Mich., where it will be installed in a 60 by 90 foot building, to be erected on a site donated by the Saginaw Board of Trade. The company manufacture automobile supplies, plumbing fixtures, and make a specialty of brass pipe bending. A complete brass foundry will be installed at the new location.

As the result of increased business the Automatic Machine Company, Bridgeport, Conn., manufacturers of automatic threading lathes, scroll threading lathes, Coulter horizontal nut tappers, wire crimping and wire forming machines, presses and gasoline engines, has increased its capital stock from $300,000 to $500,000. New euqipment will be installed and with its increased capacity the company will be in a position to fill all orders.

A Western branch has been opened by the Detroit Foundry Supply Company, Detroit, Mich., at Minnesota Transfer, St. Paul, Minn., with William H. Case as manager of the same. This branch is carrying a full stock of facing, firebrick, foundry supplies, buffing compositions and polishing wheels, platers' chemicals and supplies, so as to promptly handle local business of Minneapolis and St. Paul, and Western business as well.

The Selby Smelting and Lead Company, San Francisco, Cal., announce that since the completion of their shot tower, which is modern in construction in every particular, that they are now manufacturing shot that is equal to any that is turned out by the Eastern towers and that they are at present doing a very extensive business in shot on the Pacific Coast, securing a large share of the business which formerly went to Eastern manufacturers.

The Bunting Brass & Bronze Company, manufacturers of brass, bronze and aluminum castings, of Alliance, Ohio, report that they have started the erection of a new plant in Toledo, which will be of brick and steel throughout. The main building will be 54 by 200 feet, part of which will be in two stories, and there will be four minor buildings to complete the plan. The company now are purchasing new foundry equipment, office fixtures, etc.

The Standard Welding Company, Cleveland, Ohio, are now occupying the addition of their plant, which gives them 85,000 square feet more floor space and increased their capacity about 50 per cent. The company report, through A. C. Clark, that there is a growing demand for tubing for various purposes and also a material increase along the lines of electric welding which indicates a much improved and far healthier condition of business than formerly.

In an account in the October issue of THE METAL INDUSTRY of the organization of the Backus & Leeser Company, 410 and 412 West 13th street, New York, manufacturers and dealers in electro-platers' supplies and polishing materials, the name of one of the interested parties was given as C. W. Leeser. It should have been C. B. Leeser. Mr. Leeser and Mr. Backus were both connected for a long time with the New York office of the Zucker & Levett & Loeb Company.

The Waterbury Rolling Mills, Waterbury, Conn., have placed an order with the Farrel Foundry & Machine Company of Ansonia, Conn., for a new set of 16-inch rolls, and auxiliary machinery which will practically double their output in certain lines. This equipment will be installed in the addition to their plant which they completed last year. It is expected that it will be in running order by the first of next year. F. B. Beardsley is president of the company and R. D. Somers is vice-president and general superintendent.

The McKim Foundry & Machine Company, Lockport, N. Y., after an existence of sixty years, was incorporated with a capital stock of $25,000. This company manufacturers brass and bronze castings, and does light and heavy machine jobbing work as well as building machinery of all kinds to order. Both the machine shop and foundry are being enlarged and up-to-date machinery is being added to the present equipment. The officers of the company are: T. G. McKim, president; L. J. Hooker, vice-president, H. M. Wood, secretary and treasurer.

The Globe Machine & Stamping Company, manufacturers of die stampings, tumbling barrels, etc., Cleveland, Ohio, will at once begin the erection of a new plant to provide a floor space of 16,000 square feet, which will be devoted to the manufacture of battery boxes and tools. This is only the first section of a large main building intended to contain about 40,000 square feet of space, which will be used for the stamping, tumbling barrels and special machinery departments, and it is expected that the first section will be occupied about March 1, 1911.

The International Chemical Company, Camden, N. J., is sending out to the trade information concerning their "K. W. T. Kleaner" ((K)leans (W)ithout (T)arnishing) stating that it is particularly suited to the cleaning of highly colored brass, copper, bronze, etc., where it is important that the surface should not be tarnished before plating. It is particularly useful where the work is to be cleaned before gold plating. The manufacturers state that this material sells at 4½c. to 5c. lower than many similar articles which have heretofore been used by manufacturing jewelers.

Henry S. Wyckoff, who at one time was Eastern representative of the Zucker & Levett & Loeb Company, and later secretary and sales manager of The Levett Manufacturing Company, is now established in business at 78 Barclay street, New York, as a manufacturer of dynamos and motors and platers' and polishers' supplies. Mr. Wyckoff has handled some of the largest contracts ever placed for plating and polishing equipment, and states that he is now in a position to figure advantageously on entire plants, regardless of size.

Cullen & Atkinson Company, Inc., Hartford, Conn., have been extremely busy building and installing their ovens for lacquering, japanning and other purposes in factories where wooden ovens were formerly used. Their ovens have a number of advantages which make them attractive to manufacturers: there are no cracks through which heat is lost; danger of fire is eliminated, insurance rates are lower and better work is obtained than in home-made wooden ovens or other cheaply constructed kinds. Some of Cullen & Atkinson's recent installations are at the Traut & Hine Company, and the Russell & Erwin Company, New Britain, Conn., and the Underwood Typewriter Company, Hartford, Conn.

The Northern Engineering Works, crane builders, Detroit, Mich., are completing an addition to their crane erecting shop. The new building is approximately 160 feet x 60 feet, of fireproof structural steel and brick construction, and having steel sash. Three cranes and two overhead trolley runs will serve the floor. Electric and pneumatic hoists will be used. The machinery has been installed and the building will be occupied this month. A new storage yard for structural steel has been laid out alongside the addition and is covered by a 60-foot span, three motor electric Northern Gantry crane of special construction. The company reports the largest demand for their electric Northern cranes and other products in its history.

The Kortum Manufacturing Company, 10 Pearl Street, Buffalo, N. Y., which was formerly under the management of Albert

Kortum, is now under the new management of F. A. Shepherd, who has acquired an interest in the company. Mr. Shepherd was formerly manager of the International Plating Company of Buffalo, and is well known to the plating trade, he having installed and operated the plating department of the McKinnon Dash Company of Buffalo. Later on he drew up the plans and equipment for their larger plant at Troy, Ohio. The Kortum Company, in addition to manufacturing the "Zircon Metal Polish" and the "Kortum Compressed Linen Wheels," also handle a complete line of platers and polishers' supplies.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock A. M., December 6, 1910, and publicly opened immediately thereafter, to furnish at the navy yard, Mare Island, Cal., a quantity of naval supplies, as follows: Sch. 3066: Linseed oil, white zinc. Sch. 3067: Naval bronze, sheet zinc. Sch. 3068: Steel bolts and nuts, files, saws, sawblades, taps and dies, hand tools. Sch. 3069: Brass rod, sheet brass, brass pipe. Sch. 3070: Sheet zinc, magnesia pipe covering. Applications for proposals should designate the schedules desired by number. Blank proposals will be furnished upon application to the navy pay office, San Francisco, Cal., or to the Bureau. T. J. Cowie, Paymaster-General, U. S. N.

The business formerly conducted by the Falls Rivet & Machine Company, Cuyahoga Falls, Ohio, manufacturers of power transmission appliances, rivets and bolts, has been divided up as follows: Edwin Seedhouse and associates have purchased and taken over the plant and rivet, bolt, nut and washer business, and will carry it on at Kent, Ohio, under the name of The Falls Rivet & Machine Company; while Theophilus King and associates have taken the plant and power transmission and general machinery business, as carried on at Cuyahoga Falls, and it will be in the future conducted as the Falls Clutch & Machinery Company. Theophilus King, of Boston, Mass., is president and G. A. Irvin is general manager and treasurer of the latter company.

Smith & Richardson, Attleboro, Mass., manufacturers of the Imperial Polishing or Burnishing Machine, advise us that they are installing a great many of their machines throughout the country. They state that a large majority of the manufacturing jewelers in the vicinity of Attleboro and Providence use their apparatus. They have just installed four more of their outfits in one shop in Providence that had already been using four, and cite many other instances where they have secured repeat orders; for instance, Whiting & Davis, the well-known Attleboro concern, began with one barrel and now use eight. Another customer states that each barrel pays for itself every 48 hours. The only expense connected with running these machines is the cost of the steel balls, which are, of course, practically indestructible, and the cost of burnishing compound or soap, which is so small as to be almost negligible. One-quarter pound of soap, costing only two cents, will last a whole week. These barrels are suitable for burnishing small metal goods of all kinds.

CRUCIBLE PLANT CLOSING.

The Waterbury Crucible Company, Waterbury, Conn., is winding up its affairs preparatory to selling its building, machinery and stock, and going out of business. The plant is located in the heart of Waterbury, and when established five years ago it was expected to take care of the Waterbury market for crucibles, for which, of course, there is a large consumption. E. B. Seidel, the general manager of the plant, except the sales department, reports that the company was not successful in making money, owing to the overhead and selling charges, which were 25 per cent. more than the cost of the production of crucibles. The company secured both a good local and domestic trade, but could not sell at a profit. The building, which is a four-story brick structure, is for sale or lease, and parties are already considering the establishment of a metal stamping shop.

Mr. Seidel, who recently made a trip to Detroit, Mich., where he was the guest for five days of the Detroit Chamber of Commerce, is planning to take the machinery of the plant to that city and establish a crucible works in Detroit. The officers of the Waterbury Crucible Company are: President, E. B. Seidel; treasurer, L. G. Tenney; secretary, A. W. Force. It is expected these positions will cease by Jan. 1, 1911, and the plant will be closed on that date as a crucible works.

REMOVALS

M. M. Andler & Company, dealers in metals, babbitts, solders, drosses and skimmings, have removed their Boston office to 17 and 19 Farnsworth street.

The Union Equipment & Bronze Company, 1901 Park avenue, New York City, manufacturers of ornamental bronze goods, T. J. Norton, president, have removed their offices and works to Meadow Road and Passaic avenue, Rutherford, N. J.

FROM OAKVILLE TO BRIDGEPORT.

The Baird Machine Company, manufacturers of dies, foot and power presses and special machinery, oblique tumbling barrels, Oakville, Conn., have issued a statement in which the origin and history of the company is outlined, and they also give a detailed account of their reasons for the projected move of the company to Bridgeport, Conn. They say in part: "In the search for a suitable site on which to establish the plant, locations out of the Naugatuck Valley were not considered, but quite a number throughout the valley were carefully investigated, resulting in many wild rumors as to the intentions of the company. The company desired as many as possible of the following facilities: trolley and steam railroad siding, city water, gas, location on a main railroad, and land enough for future expansion and addition of a foundry.

It was not the desire of the officers of the company to leave the vicinity of Waterbury, and much time and money was lost waiting several months for development of various propositions in and around Waterbury with no good result, and after very earnest effort on the part of the Bridgeport Board of Trade, and particularly its President, Mr. Enos, a piece of land has been acquired fulfilling conditions required, in the vicinity of Bridgeport, and engineers are now at work developing and laying out an entirely new and what is hoped to be one of the most modern plants for the manufacture of light and also heavy special machinery, presses, etc.

Since 1905 the business has grown in such proportions that the management found it necessary to add to its force, competent engineers and other specialists in their various lines, developing a new modern system for the management of the concern so at the present time it has a man at the head of each department, each man being tried for his integrity, ability and those other qualities which make for firm, steady business, so that The Baird Machine Company prides itself on its management, carrying out those good principles as found in such men of the old school as Mr. Baird, and any person may rest assured that any proposition or any contract made with them will be faithfully carried out and that he will receive a square deal.

A very good idea of the business of the company can be obtained from the trade mark, shown herewith, as it can be seen to consist of building any kind of special machinery for working wire and sheet metal, four slides, wire formers, machines for making garment hooks, eyes, hose supporter, suspender and belt trimmings, novelties, and innumerable articles for domestic use, as well as presses of various sizes, and machines used in finishing articles, such as tumbling, burnishing, buffing, japanning, drying and other tumbling barrels, etc. The company also acts in an advisory capacity, as concerns can consult with its officers as to plans for the reduction of costs by means of automatic processes in the manufacture of articles of all kinds; doing with one machine in one operation what now may require several operations in several machines by several processes.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

THE UNIVERSAL WELDING EQUIPMENT COMPANY, St. Louis, Mo. Capital stock, $6,000. To manufacture machinery, etc. Incorporators: Francis Leiber, Ralph Parker and Gustav Cramer, all of St. Louis, Mo.

THE BRIGHAM BRASS MANUFACTURING COMPANY, Chicago, Ill. Capital stock, $50,000. To manufacture and sell brass and brass products. Incorporators: Silas H. Brigham and Millard S. Fegan, of Waukegan, Ill.

THE MACHINE PARTS COMPANY, Elyria, O. Capital stock, $125,000. Manufacturers of automobile steering gears, axles and Brass, manganese-bronze and aluminum castings. Incorporators: O. G. Dunn, J. S. George, W. T. Parsch and J. W. Parsch, all of Elyria.

PRINTED MATTER

AIR BRUSHES.—The Paasche Air Bruch Company, manufacturers of air and pneumatic brushes, air compressor outfits, etc., Chicago, Ill., have issued a handsome 40-page catalog, giving complete descriptions of their various forms of brushes and air compressing machinery.

BRASS GOODS.—The Arcade Manufacturing Company, Freeport, Ill., issue a folder giving illustrations and descriptions of their Arcade cuspidors. These articles are made of solid brass castings of the hardest known composition, and it is claimed that the older they get the more beautiful they become.

BEARINGS.—A handsome little brochure has been issued by the Lumen Bearing Company, Buffalo, N. Y., and Toronto, Canada, describing the characteristics of Lumen bronze bearings. Some very interesting information regarding the superior advantages of this bronze are given and should be known by everyone interested in bearing metals.

FRICTION CLUTCHES.—The Coil Friction Clutch, which is a patented mechanism, is described by the manufacturers, the Farrel Foundry & Machine Company, of Ansonia, Conn., in a recently issued two-page folder. This clutch is adapted to all kinds of transmission for light or heavy powers and at high or low speeds. Further particulars upon application.

HARDWARE.—The Yale & Towne Manufacturing Company, manufacturers of Yale locks, builders' hardware, art metal work, etc., Stamford, Conn., have issued a small booklet descriptive of a new device called the Yale Checking Floor Hinge, which is used for closing single or double acting doors, and does away with hinges entirely. Descriptions of this floor hinge together with the company's extensive line of door checking devices is included in a 40-page door check catalog which will be sent upon application.

SAND MIXING AND SIFTING MACHINERY.—The Bilz Sand Mixing & Sifting Machine Company, New York, have issued their first catalogue descriptive of their self and hand feeding sand mixing and sifting machines. These machines are manufactured in three models and are meeting with well deserved success all over the country. The catalogue is well illustrated with half-tone cuts of the various types of machines, and also contains a number of very flattering testimonials from users of the machines.

RECORDING INSTRUMENTS.—The Bristol Company, manufacturers of Bristol's recording instruments, Bristol's patent steel belt lacing, Waterbury, Conn., have issued the following new bulletins:

No. 128. Bristol's Round Form Class II Recording Thermometers.
No. 120. Bristol's Thermometer-Thermostats.
No. 135. The Wm. H. Bristol Recording Shunt Ammeters.
No. 141. Bristol's Round Form Recording Pressure Gauges.
No. 145. Bristol's Class II Indicating Thermometer.
No. 146. Bristol's Long Distance Recording Tachometer.
No. 147. Bristol-Durand Raddi Averaging Instrument.
Copies of the above bulletins may be obtained upon application.

ELECTROPLATING, POLISHING AND BUFFING EQUIPMENT.—Booklet No. 30 has been issued by the Bennett-O'Connell-Stevens Company, Chicago, Ill., manufacturers and dealers in the above mentioned supplies. The booklet is not claimed to be a catalogue, but merely gives a few selections from the complete line of goods handled by this company, which are fully described in their large general catalogue. The booklet itself is taken up principally with descriptions of electric mixing instruments, such as voltmeters, ammeters, rheostats, etc., also lacquers of all kinds and the well known line of platers' chemicals, for the sale of which this firm has gained an enviable reputation. These materials consist of nickel salts, double and single, red copper compound and numerous buffing and polishing compositions.

ABRASIVES.—The Norton Company and the Norton Grinding Company, manufacturers of carborundum, corundum and alundum, abrasive materials, have issued the anniversary number of "Grits and Grinds." This is an attractive and interesting publication which commemorates the first birthday of "Grits and Grinds," the tenth of the Norton Grinding Company and the twenty-fifth of the Norton Company. The first portion of the book is devoted to a complete roster of the employees of the Norton Company in Worcester, Mass., and also of those at Wesseling, Germany, who went from Worcester, together with the members of the company's office force of New York and Chicago. The employees of the Norton Grinding Company are also included. A complete historical description of the various plants of the Norton Companies is given, illustrated with photographs of groups of various officials and employees and also the numerous plants.

A portion of the book is devoted to a history of the Pike Manufacturing Company, of Pike, N. H., who have been the selling agents for the India oil stones manufactured at Worcester. The Norton Company, early in 1910, acquired an interest in the business of the Pike Manufacturing Company, and this end of the business is now directed by E. Bertram Pike, who succeeded to the presidency at the death of his father, Edwin B. Pike. The foreign interests of the Norton Companies are represented and taken care of by H. Schutte and B. Schuchardt of Wesseling, Germany. An interesting historical sketch of cylindrical grinding machines occupies the last eight pages of the book, and is written by C. H. Norton. This article covers a period of forty-five years and traces the progress of the grinding industry from its infancy to the persent time, and is illustrated by half-tone cuts of the various types of grinding machinery manufactured by the Norton Grinding Company.

AD NEWS

F. J. Lederer Company, 400 Guilford street, Buffalo, N. Y., are advertising their "Buffalo" air brush. This sprayer, they state, is a great labor saver when used for applying lacquer, enamel paint or similar materials on almost any kind of surface.

C. A. Woolsey Paint & Color Company, Jersey City, N. J., are advertising their paints, which they furnish for all purposes. They make a specialty of aluminum and gold paints, enamel paints, graphite paint and a special paint for engines and machinery, which they supply in black and colors.

The Goodale Company, Kalamazoo, Mich., invite the attention of foundrymen to their advertisement in this issue for the "Kalamazoo System of Aluminum Matchplate Molding," which they state gives more and better brass, bronze, copper, iron or steel castings for less money than any other method.

Kirk & Blum, Cincinnati, O., illustrate and describe in their advertisement their adjustable dust-collecting hood for use with polishing lathes. These hoods are shipped from their factory complete and ready to be attached to the piping, and can be installed with very little trouble.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

November 7, 1910.

		Pounds.
Stocks of marketable copper of all kinds on hand at all points in the United States, Nov. 1, 1910.....		148,793,714
Production of marketable copper in the United States from all domestic and foreign sources during October, 1910		126,469,284
		275,262,998
Deliveries:		
For domestic consumption	67,814,172	
For export	68,186,912	136,001,084
Stocks of marketable copper of all kinds on hand at all points in the United States, Nov. 1, 1910...		139,261,914
Stocks decreased during the month of October....		9,531,800

METAL MARKET REVIEW

NEW YORK, November 14, 1910.

COPPER.—The London market for Standard warrants has shown steady and advancing values, with an increasing speculative demand, showing a growing belief in the metal and also in the curtailment programme of the largest producers. Prices in London show an advance of nearly £2 per ton and the buying at the close has been more active.

In the New York market there has been a good general buying all the month, both by home consumers and for export, while prices have held very firm at around 13 cents for Lake, 12¾ to 12⅞ cents for Electrolytic, and about the same price for high grade Casting brands.

The market is in good shape and consumers at last are willing to take hold and contract for part of their requirements for the first quarter of 1911 buying and willing to pay ¼ cent over the spot price for January, February and March copper, but buyers are not anxious for this future business at these prices. The general trend of the market is for gradually advancing prices.

Statistically the market is in good shape; surplus stocks both here and abroad are rapidly decreasing. The exports for the month were 27,512 tons. The foreign statistics show a decrease in the visible supply of close to 6,000 tons, or 13,440,000 pounds, during the month, or a decrease from the highest point in the year, February 15, of 114,100 tons to 88,420 tons total visible today. According to the Copper Producers' Association, stocks in America decreased over 20 million pounds last month, and a further decrease of another 20 million is looked for again during the month of October. The figures as published November 7 show a decrease of only 9,531,800 pounds, leaving a stock on hand today of 139,261,914 pounds, against a total of 340,000,000 pounds, in March, 1910, the high point of the year.

The market holds firm Lake, 13 to 13¼ cents; Electrolytic, 12¾ to 13 cents; Casting brands, 12¾ to 12⅞ cents.

TIN.—The London tin market continues in the throes of a very strong bull syndicate, and prices are manipulated to suit the powers that be. Here is the story of the fluctuations of spot tin in London during the month of October: opened at £157 12s. 6d; highest, £171; lowest, £157 5s.; and closed at £166 17s. 6d. Today futures are about 5s. over the spot price.

The New York market has had to buy tin at the rate of about 3,300 tons per month and will have to pay whatever price the syndicate likes to ask. Spot in today is quoted at around 36 to 36¼ cents, November and December deliveries the same price.

LEAD.—The foreign market is a shade higher at £13 5s., against £12 15s. a month ago.

The New York market has ruled steady all the month at 4.40 to 4.45 New York, and from 4.25 to 4.30 at St. Louis. The Trust price is 4.40 New York for 50 ton lots.

SPELTER.—The foreign market advanced a few shillings during the month from £23 15s. to £24 2s. 6d. at the close.

In the New York market prices have been advanced by the leading sellers in face of an average supply of ores and a very poor demand. Opening at around 5½ New York, prices have been pushed to 5.87½ and close at the highest. In the St. Louis market prices advanced from 5.40 to 5.75.

ALUMINUM.—The foreign market is firmer and prices are fully ¼ cent per pound higher at 22½ to 22¾ cents for wholesale lots of 98-99% in ingots. For smaller lots prices range from 23 to 24 cents.

ANTIMONY.—The foreign market is unchanged at £29 for Halletts and £28 for other brands.

In New York prices are unchanged; Cooksons, 8:15; Halletts, 7¾ to 7.80; Chinese, 7⅜; Hungarian, 7¼.

SILVER.—The London price of silver has advanced nearly 1d. an ounce, opening a 24⅞d. and closing at 25 13-16d. In the New York market silver has been very firm and advanced from 54 to 56 cents per ounce. The advance has been caused by a good demand from the East.

QUICKSILVER.—There has been no change in quicksilver; wholesale lots, $46.00 per flask; with retail lots, $46.50 to $47.50, according to quantity.

PLATINUM.—The market for platinum has been very strong. Foreign cables reported an active and advancing market and prices today are $1.50 per ounce higher than a month ago. Hard is quoted in wholesale lots at $41.50, ordinary at $39.50. Scrap is worth from $33.00 to $35.00.

SHEETS.—Copper wire advanced ¼ cent to 14¼ base; sheets are unchanged at 18 cents base, sheet brass at 14 cents.

OLD METALS.—The market has been firmer and prices have advanced from 25 to 50 cents on all copper scrap. There has been a better demand and some good business reported.—J. J. A.

SEPTEMBER MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	13.00	12.75	12.85
Electrolytic	13.00	12.50	12.75
Casting	12.90	12.50	12.70
TIN	38.00	34.90	36.50
LEAD	4.45	4.45	4.45
SPELTER	5.90	5.65	5.75
ANTIMONY (Hallett's)	7.80	7.75	7.80
SILVER	.56	.53¾	55.49

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.

1909.—Average for year, 13,416. 1910, Jan. 13⅞. Feb. 13⅞. March, 13¾. April, 13¼. May 13. June 12¾. July 12¾. Aug. 12⅝. Sept. 12¾. Oct. 12⅞.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Metal Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

INFORMATION BUREAU

Any firm intending to buy metals machinery or supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Commercial questions are answered by return mail. Our information Bureau is for the purpose of answering questions of all kinds. Address THE METAL INDUSTRY, 99 John street, New York.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the back advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds. See Want Ad. pages.

Metal Prices, November 14, 1910

NEW METALS.

	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, carload lots	13.00
Electrolytic, carload lots	12.75
Casting, carload lots	12.70
TIN—Duty Free.	
Straits of Malacca, carload lots	36.00
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2⅜c. per lb.	
Pig lead, carload lots	4.45
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western carload lots	5.90
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots	28.00
100 lb. lots	25.00
Ton lots	22.50
ANTIMONY—Duty 1½c. per lb.	
Cookson's, cask lots, nominal	8.12
Hallett's, cask lots	7.80
Other cask lots	7.12
NICKEL—Duty Ingot, 6c. per lb. Sheet, strips and wire 35% ad valorem.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.45 to .60
MANGANESE METAL—Duty 20%	.90
MAGNESIUM METAL—Duty 3 cents per pound and 25% ad valorem	$1.60
BISMUTH—Duty free	2.10
CADMIUM—Duty free	.80
	Price per oz.
GOLD—Duty free	$20.67
SILVER—Duty free	.56
PLATINUM—Duty free	$39.50 to $41.50
QUICKSILVER—Duty 7c. per lb. Price per pound	.62c. to 64c.

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
11.25 to 11.50	Heavy Cut Copper	12.25 to 12.50
10.75 to 11.00	Copper Wire	11.75 to 12.00
9.75 to 10.00	Light Copper	10.75 to 11.00
10.25 to 10.50	Heavy Mach. Comp.	11.25 to 11.50
7.50 to 7.75	Heavy Brass	8.25 to 8.50
5.75 to 6.00	Light Brass	6.75 to 7.00
7.25 to 7.50	No. 1 Yellow Brass Turnings	8.00 to 8.25
8.25 to 9.00	No. 1 Comp. Turnings	9.25 to 9.50
3.90 to 4.00	Heavy Lead	—— to 4.25
3.75 to 3.90	Zinc Scrap	—— to 4.25
5.00 to 5.50	Scrap Aluminum, turnings	5.00 to 6.50
10.00 to 12.00	Scrap Aluminum, cast, alloyed	11.00 to 13.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 18.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
25.00 to 27.00	Old Nickel	28.00 to 30.00

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% to 20% ..... according to quantity	28 to 35
Silicon Copper, 30% guaranteed ... " "	38
Phosphor Copper, 5% ..... " "	19 to 21
Phosphor Copper, 10% to 15%, guaranteed ..... " "	28 to 30
Manganese Copper, 30% ..... " "	30 to 35
Phosphor Tin ..... " "	34 to 36
Brass Ingot, Yellow ..... " "	9 to 10
Brass Ingot, Red ..... " "	11 to 12½
Bronze Ingot ..... " "	10 to 11
Manganese Bronze ..... " "	17 to 19
Phosphor Bronze ..... " "	13 to 16
Casting Aluminum Alloys ..... " "	29 to 35

PHOSPHORUS—Duty 18c. per lb. According to quantity	30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 18 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7⅝ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7⅝ lb. sheet 80 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from. 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add ..... 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add ..... 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ⅝ inch diameter or over ..... **Base Price.**

(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

	Cents per lb.
ZINC—Duty, sheet, 1½c. per lb.	
Carload lots, standard sizes and gauges, at mill	7.75 less 8%
Casks	8.25
Open casks	8.75

Metal Prices, November 14, 1910

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect June 27, 1910, and until further notice.

To customers who purchase less than 40,000 lbs. per year and over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.13¼	$0.14⅝	$0.16⅝
Wire	.13¼	.15½	.17
Rod	.13¼	.15½	.18
Brazed tubing	.18⅜	—	.20½
Open seam tubing	.16⅜	—	.18½
Angles and channels, plain	.16⅜	—	.18½

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14¼	$0.15⅝	$0.17¾
Wire	.14¼	.16½	.18
Rod	.14¼	.16½	.19
Brazed tubing	.19⅜	—	.21½
Open seam tubing	.17⅜	—	.19½
Angles and channels, plain	.17⅜	—	.19½

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

14¼c. per lb. base.

SOLDERING COPPERS.

500 lbs. and over in one order	18½c. per lb. base.
100 lbs. to 300 lbs. in one order	19c. " " "
Less than 100 lbs. in one order	20½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in O. D. Nos. 4 to 13 Stubs' Gauge, 18c. per lb.
Seamless Copper Tubing, 21c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	26	25	20	19	18	18	18	18	18	18	18	19	20	22	24	25

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet— Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1½ inch	25	27
1¾ inch	32	35
1⅞ inch	45	48
2 inch	56	60

Discount 55 and 5%.

PRICES FOR MUNTZ'S METAL AND TOBIN BRONZE.

Muntz's or Yellow Metal Sheathing (14" x 48")	14½c. net base
" " " Rectangular sheets other than Sheathing	16½c. " "
" " " Rod	14½c. " "
Tobin Bronze Rod	16c. " "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bars in the rough, 22¼c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 2c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 3c. above price of pig tin.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than..... and including.....	3in. 12in.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.
	in coils.								
No. 13 and heavier	34	34	36	36	36	36	39	39	39
" 14	34	34	36	36	36	36	39	39	39
" 15	34	34	36	36	36	36	39	39	39
" 16	34	34	36	36	36	36	39	39	39
" 17	34	34	36	36	36	36	39	39	39
" 18	34	34	36	36	36	36	39	39	42
" 19	34	34	36	36	36	36	39	40	43
" 20	34	36	36	36	36	38	41	42	44
" 21	34	38	38	38	38	40	43	44	50
" 22	34	38	38	38	40	40	43	47	51
" 23	34	38	38	38	40	40	43	49	52
" 24	34	38	40	42	42	42	45	51	54
" 25	36	39	41	43	43	43	46	53	57
" 26	36	39	42	46	46	46	51	55	61
" 27	36	40	44	48	48	49	54	58	64
" 28	36	40	46	48	49	49	56	62	67
" 29	38	41	48	50	52	52	61	67	72
" 30	38	42	50	52	56	62	69	72	77
" 31	43	47	55	58	63	71	74	77	83
" 32	45	49	57	61	69	77	91	90	95
" 33	47	51	60	65	73	84	91	100	110
" 34	50	55	62	70	78	91	108	110	120
" 35	..	65	70	80	90	100	115	125	..
" 36	..	80	90	100	115	120	135	..	..
" 37	..	104	114	129	144	159	174	..	..
" 38	..	124	139	154	169	184	204	..	..
" 39	..	144	164	184	204	224	..	..	..
" 40	..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	27	24	..	..	14	20	10	9	16	23
12.	.109.	..	..	..	..	..	..	..	26	..	..	..	15	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	17	..	..	..	..	..
16.	.065.	..	..	..	..	28	27	27	24	23	21	21	21	21	21	27	31	37
18.	.049.	..	..	..	..	33	30	29	28	25	26	26	26	..	..	..	..	..
20.	.035.	117	..	46	39	34	33	32	30	29	30	30	30	31	38	49	58	81
21.	.032.	..	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	138	98	48	42	38	37	35	34	..	..	45	..	..	..	..	..	..
24.	.022.	188	133	108	88	79	73	62	60	66	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge.	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb.	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4	per cent.	to No.	19, B. & S. Gauge,	inclusive	$0.60
6	"	"	19, "	"	.70
9	"	"	19, "	"	.85
12	"	"	19, "	"	1.00
15	"	"	19, "	"	1.15
16	"	"	19, "	"	1.20
18	"	"	19, "	"	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICE OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. to 3½c. above the price of bullion.

ALUMINUM COMPANY OF AMERICA

PITTSBURGH, PA.

ALUMINUM

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EXTRUDED SHAPES
ROD RIVETS WIRE
ELECTRICAL CONDUCTORS

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PITTSBURGH—2344 Oliver Bldg.
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SEAMLESS DRAWN BRASS AND COPPER TUBING
BRASS { SHEET ROD WIRE
COPPER { SHEET ROD WIRE
GERMAN SILVER { SHEET ROD WIRE
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Non-Corrosive Finest Quality
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Naval Bronze
Manganese Bronze
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COPPER
In Sheets, Plates, Rolls
ANODES
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BRASS and COPPER
Sheets, Rods, Wire and Tubing
Manganese
Aluminum
Phosphor
Silicon and "Bridgeport"
BRONZE
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Manufacturers
BRIDGEPORT, CONN.

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H. K. & F. S. BENSON
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NICKEL SILVER, BRASS, COPPER, BRONZE AND PURE COPPER
TUBING FOR ELECTRICAL PURPOSES
Odd and Special Shapes, and Small Tubing, a Specialty
—ALSO THE—
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All sizes from 8 to 36, B. & S. Gauge.

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SOLE MANUFACTURERS TOBIN BRONZE
(Trade-Mark Registered)

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"RIVERSIDE" German Silver Phosphor Bronze
Sheets, Rods, Wire, Ingots, Castings, Jewelers' Bars and Alloys
The Riverside Metal Co.
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SPECIAL SHAPES
Wire Drawing, Tinning, Slitting
in
BRASS, BRONZE, COPPER, STEEL, ALUMINUM, GERMAN SILVER AND SPECIAL ALLOYS.
THE ELECTRICAL ALLOY CO., Morristown, N. J.

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INGOT, PLATE, SHEET, ROD, WIRE, TUBE, METAL GOODS.

SEAMLESS STEEL TUBING
From 4 in. Diameter to 1-64 in.
Finished Bright, Smooth and Accurate to 1-1000 In. Inside and Out
Tool Steel Tubing. Soft Steel Tubing. Also Small Brass, Copper and Aluminum Tubing.
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Oak Lane Station, Philadelphia, Pa.

ROLLED FIRELESS STERLING SILVER
SILVER SOLDERS, ANODE SILVER and SILVER WIRE
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SHEET BLOCK TIN
CASTING, ROLLING AND REFINING.
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STANDARD ROLLING MILLS
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SHEET METAL AND WIRE GOODS

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FANCY ROLLED METALS
Nickelzinc, Brasszinc, Copperzinc, Bronzezinc, Nickeltin, Brasstin, Coppertin, Bronzetin Sheet Zinc, polished and unpolished, for stamping.
Large Saving to Manufacturers Last Year's Sales 1,000,000 lbs.
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made from any metal desired.
English style. The finest made.
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LA SALLE, ILLINOIS
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The Original Brand of Pure Spelter
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241 and 243 Front St., New York
Offer for Sale:
HEAVY COPPER AND WIRE
Ready for the Crucible
COMPOSITION
Carefully Selected
HEAVY YELLOW BRASS
Free from Iron
OLD METALS GENERALLY

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Manufacturers of High Grade PHOSPHOR TIN, PHOSPHOR BRONZE, PHOSPHOR COPPER, Containing up to 15% Phosphorus. MANGANESE COPPER.

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Copper
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Improves the Strength of

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THE Metal Scavenger

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Prevents the formation of Pores, Blow-holes or Cold-shuts in Castings.

Also prevents excessive shrinkage.

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KALAMAZOO, MICH.

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For Advertisement of

U. S. REDUCTION CO.

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ARE THE ORIGINAL AND ONLY MANUFACTURERS OF

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ALUMINUM CASTINGS

Our Aluminum Castings are especially adapted to Automobile, Auto Boat and Aerial Construction.

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Fancy Goods
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COOKING UTENSILS | SPECIALTIES CASTINGS

BRONZE BRASS ALUMINUM

CASTINGS

SEND US YOUR ORDERS AND YOUR INQUIRIES --- WE WILL SAVE YOU MONEY

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348 WEST 12th STREET

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SCALES, DIALS, ETC.

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We have the most modern plant. Best work. Lowest prices.

Have your sign repaired. We replate and re-enamel equal to new.
Electro-gold, silver, copper and nickel plating.

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I have had 37 YEARS of practical experience in etching knives, razors, scissors, hammers, axes, revolvers, clock dials, sign plates, door plates.

For a liberal compensation I will teach my process to manufacturers and fit up plants.

I make a specialty of etching plates in steel, copper, brass and zinc for transferring and embossing. Also silverware, including such articles as mirror, brush and comb backs, book and album covers, trays, souvenir spoons and similar articles.

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WE CAST AND FINISH ANYTHING IN METAL.

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Our volt meters are built in various sizes, reading from 0 to 10 volts, and having from six to fifteen terminals or binding posts for connection to dynamos and to groups of from five to fourteen tanks. They are supplied with six, ten or fifteen stops and the switch makes a perfect contact on every stop. Magnets are of best grade tungsten magnet steel carefully formed, hardened, and aged for at least six months. Fitted with jeweled bearings consisting of sapphires of the best grade. All pivots ground and polished to a perfect point.

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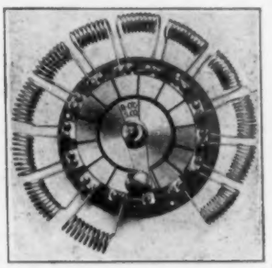
tells all about our Plating Dynamos and Platers' Supplies and Equipment.

Special Bulletin, No. 102

fully describes our new line of Polishing and Buffing Machinery, Equipment and Supplies.

Booklet No. 30

relates to improved method of Reducing Costs in the Plating Room.



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For controlling voltage at the plating tank in Copper, Nickel, Brass, Bronze and Zinc Plating. There are seldom two solutions of the same density. These instruments regulate the voltage to conform to the amount of surface in the tank and the different density of solutions. Made in seven sizes, including No. 1A, especially adapted for silver plating. Tell us the size of your tank and kind of solution, and we will quote on a suitable rheostat and guarantee it to give satisfaction.

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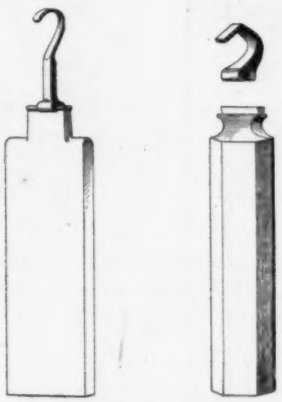

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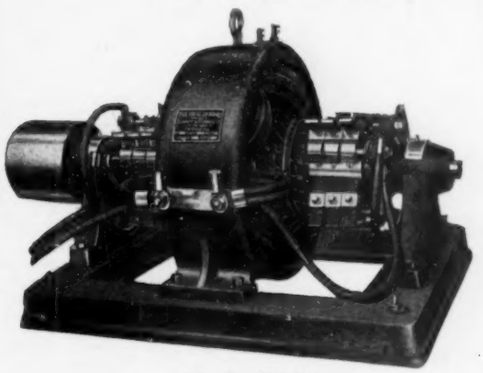
We quote very satisfactory prices on nickel anodes, made from 90 to 92% absolutely pure Canadian grain nickel, with or without patented nickel hooks. Large stock of all shapes and sizes on hand. When ordering anodes with hooks, state diameter of rod on which anode is suspended.



NO. 10 DYNAMO.

Compound Wound, Multipolar Plating Dynamos built in fifteen sizes, from 50 amperes to 6,500 amperes, six to twelve volts. State the kind of solutions you operate and amount of work to be plated and we will gladly quote price on a dynamo that we guarantee to fill your needs satisfactorily.

No. 15. Provided with dustproof hinged hood for use when belted from below floor. Belt shifter at rear. Frame cast in one piece with straight front to prevent interference with work. Note the long bearings.

BENNETT-O'CONNELL COMPANY

Complete Plating and Polishing Outfits and Supplies.

15-17 South Clinton Street
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No. 20-A. Double arbor polishing and buffing lathe with two independent spindles. Either operator may start or stop his wheel without the slightest interference with other workman. No machine yet produced equals this as a time and cost saver.

TO CONTROL

the deposit of metal in a plating bath absolutely, without watching an ammeter or clock, you should use

The Sangamo Ampere-Hour Meter

Dial calibrated to read direct in weights of any metal.

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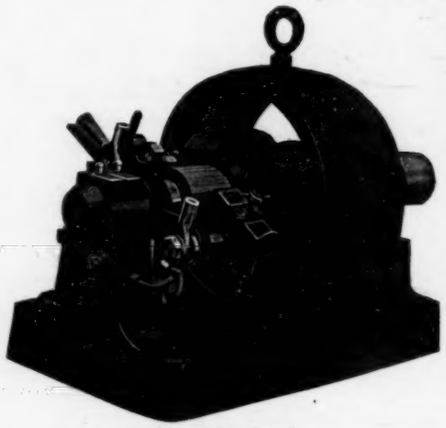
W. CANNING & Co.
BIRMINGHAM
(ENGLAND)



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LOW VOLTAGE DYNAMOS from 20 to 3000 Amperes for Electro-Depositing, Metal Refining, etc. CANNING'S "SPECIAL" Nickel Salts, "LUSTRE" Polishing Composition.

Contractors to H. M. Government and other Governments, Railways, etc. Established 1785

This Machine will *Dry Out* metal goods after plating, dipping, pickling, etc., without the use of sawdust.

DRIES IN A FEW MINUTES

Very easily operated, and hoist takes out work.

This size has a capacity of 24 quarts.

Also made in a smaller size for manufacturing jewelers, and jobbing plating use, with a capacity of 11 quarts.

The CURTIS DRYER COMPANY

93 & 95 Foster Street - Worcester, Mass.

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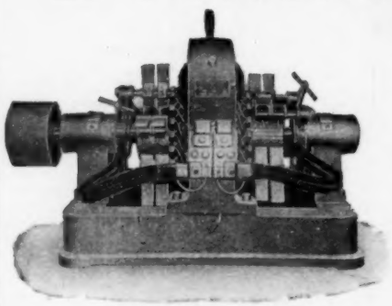

For Electroplating, Electrotyping and Electro-Galvanizing in single, two and three voltages

60 to 10000 Amperes, 3 to 30 Volts

Shunt, compound and separately excited

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Cable Address "MACHELECT" **'Phone, 581 Chelsea**

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Illustrating Method of Dumping.

Easily adjustable for more or less violent rattling. Easily dumped.

Easily swept around—it's a one-legged machine. Sieve Cap provides easy way to separate saw dust from tumbled material. Ten sizes. Ask for catalog.

Ask for "The Silent Partner"

THE GLOBE MACHINE & STAMPING CO.

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DYNAMOS :: MOTORS

LIGHTING PLATING POWER

500 MACHINES FOR SALE OR TO RENT

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PLATERS AND POLISHERS' SUPPLIES

COMPLETE PLATING PLANTS INSTALLED

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The Acme
Oblique Plating Barrel

The LOGICAL Method of Electro-Plating
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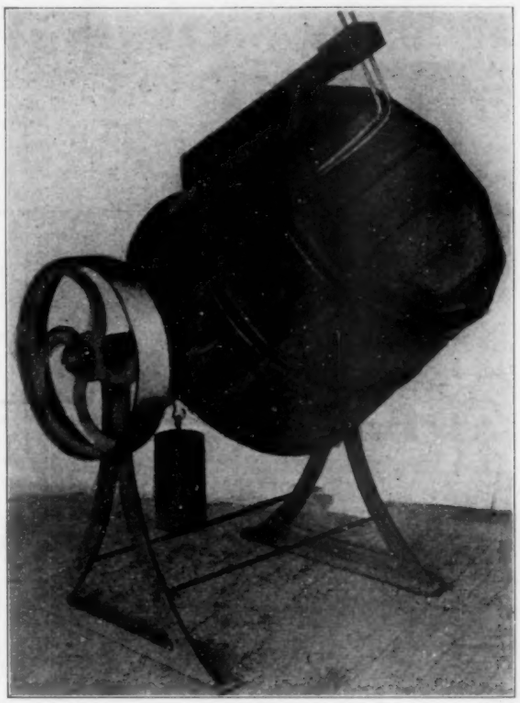

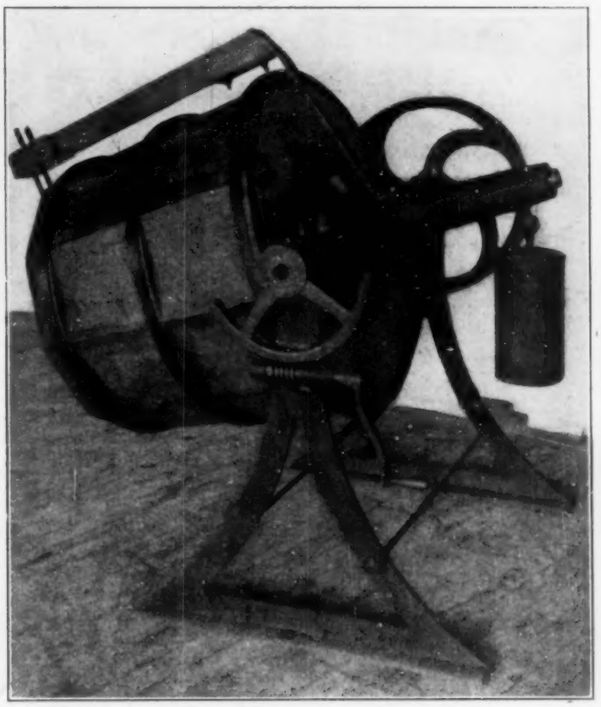

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